Technical Guidance for Completing Specified Gas Compliance Reports

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Abbreviations

AESRD	Alberta Environment and Sustainable Resource Development
BEI	Baseline Emissions Intensity
CCEMA	Climate Change and Emissions Management Act
CCEMF	Climate Change and Emissions Management Fund
CH_4	Methane
CICA	Canadian Institute of Chartered Accountants
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DUNS	Data Universal Numbering System
EI	Emissions Intensity
EPC	Emission Performance Credit
EPEA	*Environmental Protection and Enhancement Act*
EUB	Energy and Utilities Board
FC	Fund Credit
GJ	Gigajoule
GWP	Global Warming Potential
h	Hour
HFC	Hydrofluorocarbon
HHV	Higher Heating Value
IP	Industrial Process
IPCC	Intergovernmental Panel on Climate Change
ISAE	International Standard on Assurance Engagements
ISO	International Organization for Standardization
kg	kilogram
kJ	kiloJoule
kt	kilotonne
LHV	Lower Heating Value
MWh	Megawatt-hour
N_2O	Nitrous Oxide
N/A	Not Applicable
NEI	Net Emissions Intensity
NEIL	Net Emissions Intensity Limit
NPRI	National Pollutant Release Inventory
P	Production
PFC	Perfluorocarbon
RT	Reduction Target
SF_6	Sulphur Hexafluoride

SGER	Specified Gas Emitters Regulation
SoC	Statement of Certification
SoQ	Statement of Qualification
SoV	Statement of Verification
TDE	Total Direct Emissions
TAE	Total Annual Emissions
t	Tonnes

Related Publications and Forms

- *Climate Change and Emissions Management Act*
- *Specified Gas Emitters Regulation*
- *Specified Gas Reporting Regulation*

- *Alberta's 2008 Climate Change Strategy*

- *Technical Guidance for Completing Baseline Emissions Intensity Applications*
- *Technical Guidance for Landfill Operators*
- *Technical Guidance for Greenhouse Gas Verification at Reasonable Level of Assurance*

- *Technical Guidance for Developing Offset Project Developers*
- *Technical Guidance for Offset Protocol Developers*
- *Emissions Offset Quantification Protocols* (http://environment.alberta.ca/02275.html)

- *SGER Consolidated Reporting Form*
- *Landfill With Partial Gas Collection Workbook*

1.0 Purpose of this Document

The purpose of this document is to assist facilities regulated under the *Specified Gas Emitters Regulation* (the *Regulation*) in completing annual compliance reports, and to provide information about the compliance options available to facilities that are unable to meet their emissions reduction targets through facility level improvements.

Compliance reporting is used to compare a facility's annual emissions intensity to its approved net emissions intensity limit. Facilities that are not able to meet their reduction obligation through direct facility improvements can use one or more of the available compliance options to meet their net emissions intensity limit. Facilities may submit offset credits that are serialized on the Alberta Emissions Offset Registry, submit serialized emission performance credits generated at a regulated facility that has reduced its emissions intensity below its net emissions intensity limit, or purchase fund credits from the Climate Change and Emissions Management Fund.

1.1 Overview of Changes

Note: *It has been brought to our attention that there is a problem with the derivation of the CO_2 emissions factor for gas turbines and reciprocating engines in tables 3.1-2a, 3.2-1, 3.2-2 and 3.2-3 of EPA's AP 42 as well as emissions factors taken from this source including those in Table 1-6 of CAPP's 2003 Calculating Greenhouse Gas Emissions.*

As a reminder, AESRD expects the use of data and calculation methods of highest accuracy available, including the use of fuel gas analysis and mole balances instead of generic emissions factors where available. The AP 42 internal combustion factor is given as 110 lb/10^6 Btu which is not physically possible for natural gas (factor for pure methane would be approximately 115 lb/MMBtu). For reference the AP 42 table 1.4-2 value for external natural gas combustion is 120,000 lb/10^6 scf or 118 lb/10^6 Btu at a heating value of 1,020 Btu/scf. This issue has been identified to the EPA; they recognize the problem and are looking into it. In the meantime, for 2011 compliance and periods moving forward, we require the substitution of another recognized natural gas $C0_2$ emissions factor of the facilities choice.

If this EPA turbine or reciprocating engine emissions factor was used in establishing the facility baseline please contact AESRD.

The following key changes and clarifications have been made to reporting and compliance standards for the 2012 compliance cycle and are reflected in this document:

- AESRD Clarification about the roles and requirements of the lead verifier, the peer reviewer, and the designated signing authority has been provided. See Section 9 for more information.
- Additional information regarding the treatment of confidential information during AESRD audits has been provided. See Section 10 for more information.

- Guidance around the treatment of Multi-Product facilities which experience intensity swings due to changing product-mix.
- AESRD has implemented an online emission performance credit registry, similar to the offset registry. Submissions for the 2012 compliance period must continue to submit emission performance credit documentation consistent with Section 3.5 of this guidance document.
- AESRD will be requiring a standardized quantification methodology document for each facility's compliance submission starting in the 2012 compliance year. See Section 5.7 for more information.
- AESRD requires **reasonable** level assurance third party verifications starting with 2012 compliance submissions. The reasonable assurance guidance document will be finalized and posted in early 2013.
- Clarification that when March 31st falls on a weekend the deadline is extended to 4:30 pm on the next business day.

1.2 Potential Future Changes

The following areas have been identified for potential change in future compliance periods. Feedback regarding the specific proposed items is welcome.

- AESRD Significant changes to the *Specified Gas Emitters Regulation* are possible for the 2014 emissions year to support potential equivalency with federal regulation and any updates to provincial climate change strategy.
- Certain emission reduction activities at regulated facilities, including the reduction of electricity or other indirect emissions, are not currently recognized within the *Specified Gas Emitters Regulation*. AESRD is looking at potential methods to create appropriate incentive for these activities.

2.0 Overview of the Specified Gas Emitters Program

In 2002, Alberta passed the *Climate Change and Emissions Management Act*, signalling its commitment to manage the impacts of climate change and greenhouse gas emissions in the province. In 2003, Alberta passed the *Specified Gas Reporting Regulation* requiring all facilities emitting over 100,000 tonnes of carbon dioxide equivalent (CO_2e) annually to report their greenhouse gas emissions.

In 2007, Alberta passed the *Specified Gas Emitters Regulation* (the *Regulation*), reinforcing its commitment to regulate greenhouse gas emissions from large facilities. This regulation requires all facilities in Alberta emitting over 100,000 tonnes of CO_2e per year to reduce their annual emissions intensity (total annual emissions per unit of production) by 12 per cent from their 2003-2005 baseline emissions intensity. New facilities are given a graduated reduction obligation of 2 per cent per year, starting in their fourth year of commercial operations, up to a final reduction obligation of 12 per cent below their baseline emissions intensity.

Emissions intensity is regulated on a facility-by-facility basis. Each facility is given a reduction target, and its performance over time is compared to its approved baseline emissions intensity. AESRD supports and encourages consistency in reporting methodologies across individual sectors. Where appropriate, sectors are encouraged to develop sector-specific reporting methodologies that improve accuracy and consistency in reporting of greenhouse gas emissions for that sector.

The *Regulation* encourages facilities to improve emissions performance relative to production. This can be achieved through a number of initiatives, including without limitation incremental improvements in on-site energy use, development of emission offset projects, and supporting development and implementation of new emissions reduction technologies.

2.1 Thresholds

The threshold for determining if a facility is subject to the *Specified Gas Emitters Regulation* has been set at 100,000 tonnes of CO_2e per year of total direct emissions. A facility's total direct emissions must include all greenhouse gas emissions sources on site, including CO_2 emissions from the combustion and decomposition of biomass and industrial process emissions. Facilities that exceed the emissions threshold in any single calendar year on or after 2003 are considered **regulated facilities**. All regulated facilities are required to establish a baseline emissions intensity and submit annual compliance reports.

The *Regulation* currently includes facilities in the following sectors:

- Chemical Manufacturing
- Coal Mining

- Conventional Oil and Gas Extraction
- Electric Power Generation
- Fertilizer Manufacturing
- Mineral Product Manufacturing
- Oil Sands In Situ Extraction
- Oil Sands Mining and Upgrading
- Petroleum and Coal Products
- Pipeline Transportation
- Primary Metal Manufacturing
- Waste Treatment and Disposal
- Wood Product Manufacturing

2.2 Reduction Obligations

The *Regulation* requires all regulated facilities to reduce their annual emissions intensity by 12 per cent below their approved baseline emissions intensity.

Established facilities are facilities that completed their first year of commercial operation on or before January 1, 2000, or that have completed eight or more years of commercial operation. Established facilities have a 12 per cent reduction obligation relative to their baseline emissions intensity.

New facilities are those facilities that completed their first year of commercial operation on or after December 31, 2000 and have completed less than eight years of commercial operation. Emissions intensity reduction obligations for these facilities are phased in over a 6-year period at a rate of 2 per cent per year beginning in the fourth year of commercial operation, as depicted in Table 1.

Reduction Target and Baseline Period for New Facilities			
Year	**Description**	**Reduction Target**	**BEI**
Start-up	Partial calendar year of initial operations	No target	No baseline
Year 1	First full calendar year of commercial operation	No target	No baseline
Year 2	Second year of commercial operation	No target	No baseline
Year 3	Establish baseline	No target	No baseline
Year 4	First year reduction obligation	2% target	Year 3
Year 5	Second year reduction obligation	4 % target	Years 3,4
Year 6	Third year reduction obligation	6 % target	Years 3-5
Year 7	Fourth year reduction obligation	8 % target	Years 3-5
Year 8	Fifth year reduction obligation	10 % target	Years 3-5
Year 9	Considered an established facility	12 % target	Years 3-5

Table 1: New facility reduction obligation based on the number of years of commercial operation.

2.3 Compliance Options

Facilities that are not able to meet their reduction obligation through performance improvements (e.g. technology improvements, changes in maintenance and/or operations, etc.) may use one or more of the following compliance options:

1) Emission performance credits;
2) Offset credits; or
3) Fund credits.

More information about these compliance options is available in Section 4.0.

Facilities must submit sufficient credits such that their net emissions intensity is equal to their net emissions intensity limit for each compliance period. The net emissions intensity is calculated as total annual emissions minus the credits being submitted, all divided by annual production. Credits from each of the three true-up options listed above are counted equally at one tonne of CO_2e per credit.

Facilities that reduce their annual emissions intensity below their net emissions intensity limit are eligible to request emission performance credits, which can be banked for future use at the same facility or traded/sold to other Alberta facilities that have not met their reduction targets. See Section 4.2 for more information about emission performance credits.

2.4 Greenhouse Gas Reporting Program

The greenhouse gas reporting program, operated in accordance with the *Specified Gas Reporting Regulation*, is a complementary program that requires all facilities emitting 50,000 tonnes of CO_2e or more in a calendar year to report their annual greenhouse gas emissions. Facilities whose emissions do not exceed either the 100,000 tonnes CO_2e threshold for the *Specified Gas Emitters Regulation* or the 50,000 tonnes CO_2e threshold for the *Specified Gas Reporting Regulation* may voluntarily report their greenhouse gas emissions through the *Specified Gas Reporting Program*. More information regarding this program is available on AESRD's greenhouse gas reporting website at http://environment.alberta.ca/02166.html.

3.0 Compliance Information

All facilities regulated under the *Specified Gas Emitters Regulation* must submit annual compliance reports to AESRD. Facilities that undergo decommissioning or significant changes to the operation such that they no longer fit the definition of "Facility" prescribed in the *Regulation* may be removed from the *Regulation* upon receipt of written notice from the Director. Decommissioning is discussed in more detail in Section 3.7.5 below and in the *Technical Guidance for Completing Baseline Emissions Intensity Applications* document.

3.1 Baseline Emissions Intensity Establishment

All regulated facilities must establish a baseline emissions intensity by submitting a baseline emissions intensity application to AESRD for review and approval before submitting annual compliance reports. More information about the baseline emissions intensity application process can be found in the *Technical Guidance for Completing Baseline Emissions Intensity Applications* document.

3.2 Submission Deadline

The submission deadline for specified gas compliance reports is March 31 of the year following each emissions year. AESRD recognizes the time constraints imposed by this deadline and is reviewing the implications of adjusting the submission deadline for future cycles.

If the due date lies on a weekend or statutory holiday, facilities will have until the following business day at 4:30pm to submit their documents to the Climate Change Secretariat.

3.3 Third Party Verification

All compliance reports must be verified to a reasonable level of assurance by a third party verifier to ensure accuracy of the submission and verify conformance with the *Regulation*. More information about verification requirements is available in Section 9.0.

3.4 Signatures

The *Electronic Transactions Act* allows for the use of electronic signatures in place of written signatures. Electronic signatures must be sufficient to identify the person signing and must be consistent with the purpose of the document or record being signed. AESRD will accept electronic signatures for the purposes of compliance under the *Specified Gas Emitters Regulation*, but reserves the right to request signed originals where the electronic signature is ambiguous or cannot be verified.

3.5 Required Submission Documents

The following documents must be completed and submitted to AESRD by the submission deadline:

- Third party verified specified gas compliance report (in the original electronic format provided by AESRD);
- Additional supporting documents, including:
    - Quantification methodology document. information on the document template and requirements is available in Section 5.7, and
    - Simplified process flow diagram showing material flows and emission sources labelled by source category;
- Third party verification report and the following 3 verification submission documents (signed pdf version);
- Signed Conflict-of-Interest checklist;
- Signed Statement of Qualification form,;
- Signed Statement of Verification form;
- Signed Statement of Certification form;
- Signed Emission Performance Credit Request form, if applicable;
- Applicable supporting documentation for compliance true-up:
    - For offset credits,
        - A copy of the confirmation of initiation of retirement for offset credits generated by the Alberta Emissions Offset Registry
    - For fund credits,
        - Payment and the completed fund credit purchase form must be submitted to the Government of Alberta. A copy of the fund credit purchase receipt will be automatically forwarded to AESRD once payment is processed; and
- A confidentiality request letter, if applicable.

To avoid delays in the AESRD review process, facilities are encouraged to request their third party verifier to review the documentation associated with all credit options being submitted for compliance.

Sufficient information should be supplied to allow AESRD to understand the annual compliance report and underlying calculations. Providing sufficient information can reduce the time required for AESRD to review and accept the submission as complete.

3.6 Submission Process

Compliance reports may be submitted electronically to AENV.GHG@gov.ab.ca. For administrative purposes, separate e-mail submissions must be made for each facility.

Alternatively, electronic documents may be submitted on electronic storage media (e.g. USB flash drive, compact disc, etc.) to the address below. Signed documents may be submitted either electronically (with the appropriate electronic signature), or in hard copy to:

Director
Climate Change Secretariat
AESRD
12th Floor Baker Centre
10025 106 Street NW
Edmonton, Alberta
T5J 1G4

An e-mail confirming receipt of each compliance report will be sent to the facility reporter once the submission has been received. AESRD will conduct a review of each compliance report. In accordance with section 12 of the *Regulation*, AESRD may request additional information or materials to support the review.

After the review has been completed, the Director will notify the facility in writing that either:

1) The compliance report submission has been reviewed and accepted as complete, and that the facility is in compliance with the *Regulation*; or
2) Corrective action is required for the facility to achieve compliance with the *Regulation*.

A schematic overview of the compliance submission process is provided in Figure 1 below.

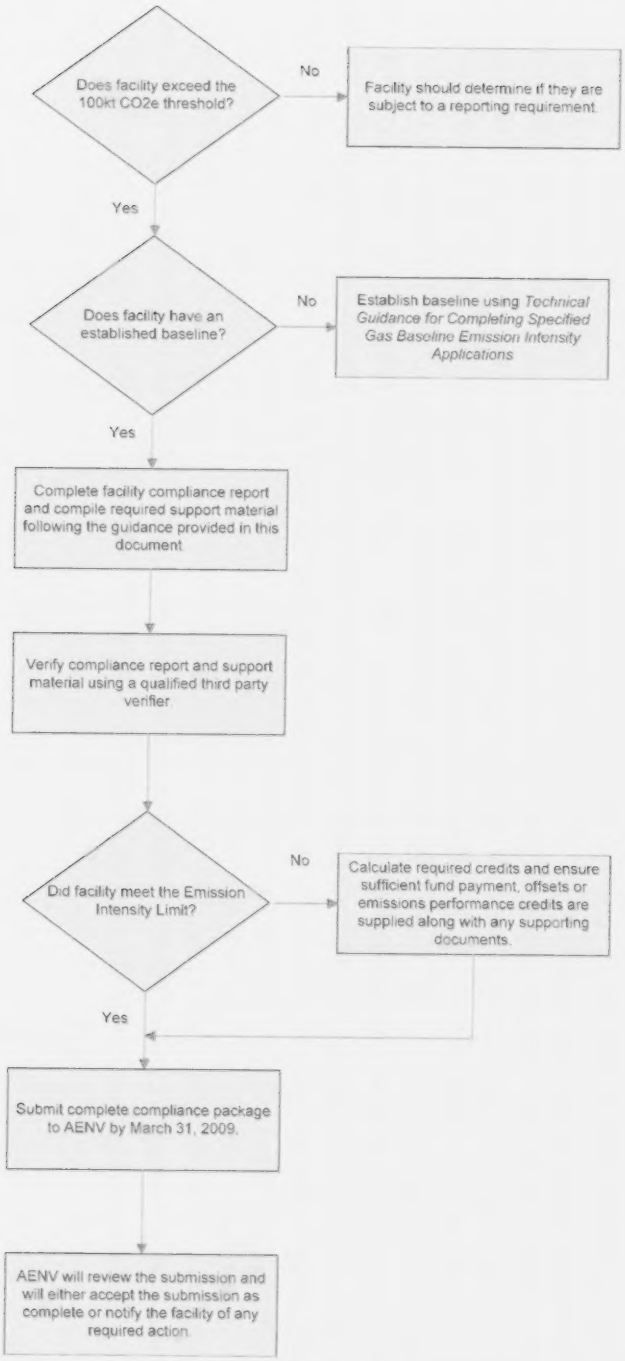


Figure 1: Compliance report submission review and decision tree.

3.7 Special Circumstances

3.7.1 Methodology Unavailability

Situations may occur where the calculation methodology used in the baseline emissions intensity application is not available for use in an annual compliance report due to metering changes or data unavailability. In such cases, facilities should contact AESRD to discuss the most appropriate path forward.

More information about emissions estimation methodologies is provided in Section 5.3 and in the *Technical Guidance for Completing Baseline Emissions Intensity Applications* document.

3.7.2 Major Modifications and Operational Changes

AESRD must be notified whenever modifications or operational changes that affect production, emissions, or emissions intensity by more than 10 percent from previous reporting periods are made to a regulated facility. Major modifications include the installation of new equipment, replacement of old equipment, conversion of fuel-burning equipment to electricity, and other changes that affect facility operation. AESRD will work with the facility to determine the most appropriate path forward, which may include, without limitation, restatement of the baseline emissions intensity.

Companies are encouraged to notify AESRD of any planned future modifications in order to help avoid delays or resubmissions after the changes have been made.

Options available to the director in the event of significant changes at the facility include, but are not limited to:

- Baseline period change
- Same year baseline (use compliance period intensity as the baseline, i.e. a straight target on emissions)
- Re-calculated baseline that accounts for the change
- Benchmark baseline relative to similar facilities in the sub-sector

Note: assessment of EPC requests are further explained in Section 4.2

In assessing the options for addressing major modifications or operational changes at facilities the goals are:

- Facilities that are not new are still subject to the *Regulation*
- Maintain a compliance burden consistent with intentional improvements in emissions and the intent and stringency of the *Regulation*
- Ensure facilities have a baseline that is representative for assessing actual performance in the compliance year
- Reduce large swings in compliance burden due to changes resulting from external factors such as changes in market conditions

3.7.3 Multi-Product or Inlet Facility

Emission intensities from multi-product and multi-inlet facilities have the potential to fluctuate annually due to a number of factors. Some of these contributing factors are not eligible to reduce compliance obligation or generate emissions performance credits. Examples of these include but are not limited to shutdown of product stream(s), adding new product streams, shifts in relative production levels.

Facilities producing multiple products must report the individual products in the compliance form and explicitly explain how these are combined into an intensity denominator. Facilities that import intermediate or alternative product feedstocks must report all imported feeds and disclose any impact this has had on emissions intensity. These can be reported in Section B4 or in the comments section.

If a facility's emissions intensity is fluctuating due to varying levels of the individual product or inlet streams, AESRD will seek to establish product weightings with the facility that reflect the emissions intensity of each product or production process. These weightings will be assigned along with a new facility baseline in order to make the compliance outcomes for the facility less sensitive to changes in the production mix. Emissions will be allocated appropriately where processes share heat or other energy or emissions intensive materials within the facility. For example if a central cogeneration unit supplies heat to multiple parts of the process the Dh value would be allocated accordingly.

Facilities using emissions based product weightings will not have a single baseline emissions intensity. Instead the facility will enter a 1 in the baseline emissions intensity field in Section E1 of the reporting form and enter the director assigned baseline emissions weightings to each product or group of products in Section B6. These weightings will then be entered in the production form as described in Section 6.3

3.7.4 Phased Expansion

Phased expansion occurs when a facility is built to accommodate a series of expansion operations, which are typically included in its approval conditions or amendments. These facilities often exhibit significant changes in emissions intensity over the course of operation. For example, a facility may have a lower operating efficiency in early operation stages when the facility is overbuilt relative to production. In such cases, the emissions intensity typically improves as the phased expansions occur and the facility shifts to operations more consistent with the design capacity.

3.7.4.1 Phased Expansion Policy Principles

The following policy principles were used to guide the consideration of policy adjustments for phased facility expansion, and are reflected in the expansion treatment policy for *in situ* oil sands extraction facilities described in Section 3.7.4.2:

- Expanding facilities are still subject to the *Regulation*;
- A price signal is maintained on all facility emissions to encourage emissions intensity improvements;
- Expansion alone cannot be a mechanism for meeting the net emissions intensity limit, generating credits, or exempting emissions from the *Regulation*;
- Each facility's baseline emissions intensity must be a relevant reference point for evaluating ongoing facility operation;
- Adaptation to expansion should minimize administrative burden on both facilities and AESRD;
- The policy must be sufficiently robust to deal with most expansions as consistently as possible, but AESRD will retain flexibility to deal with special scenarios;
- The expansion policy must be consistent with the overall system;
- Expansion should not result in excessive/punitive compliance burden;
- Significant expansions occurring in the baseline period should be similarly dealt with to avoid dilution of the ongoing reduction target at the facility; and
- The policy should separate the impact of phased expansion and the impact of innovation and technology improvement where possible. It should apply the same logic applied across the overall system for dealing with technology improvements.

3.7.4.2 Phased Expansion Treatment for the In Situ Oil Sands Extraction Sector

During expansion start up in the *in situ* oil sands extraction sector, there is typically a period lasting up to one year where the expansion phase experiences significant emissions with little or no production, creating a high emissions intensity relative to ongoing operations. This occurs in all new wells, but the effect is typically diluted by numerous mature wells for facilities operating at constant steam capacity. However, when a large portion of new steam capacity is added to a facility, a large number of wells can experience this high intensity start-up phase simultaneously, causing a significant increase in the facility's aggregate emissions intensity relative to ongoing operation. The following policy treatment for expansions in the *in situ* expansion sector has been developed in consultation with the sector to address this situation.

To be eligible to request expansion treatment, facilities must demonstrate:

1) A significant step change in emissions (25 per cent increase) associated with the addition of physical steam generation and production infrastructure;
2) That the overall facility's emissions intensity has been affected by the expansion by more than 10% compared to the baseline emissions intensity; and
3) A clear and accurate method for separating both the emissions and production between the expansion phase and the existing facility (i.e. it must be able to pass verification).

Where the criteria above are not satisfied, the whole facility, including expansion, must report against the existing baseline emissions intensity.

The emissions and production from the expansion portion of the facility associated with new equipment **and** new areas of the reservoir (areas not impacted by previous facility operation) are submitted separately for the first partial year and the first full year of expansion operation to isolate the impact of the initial intensity spike. For this separate submission, the expansion portion uses a baseline period that is the same as the compliance period, as depicted in Figure 2, and uses the reduction target applied to the original facility for that compliance year.

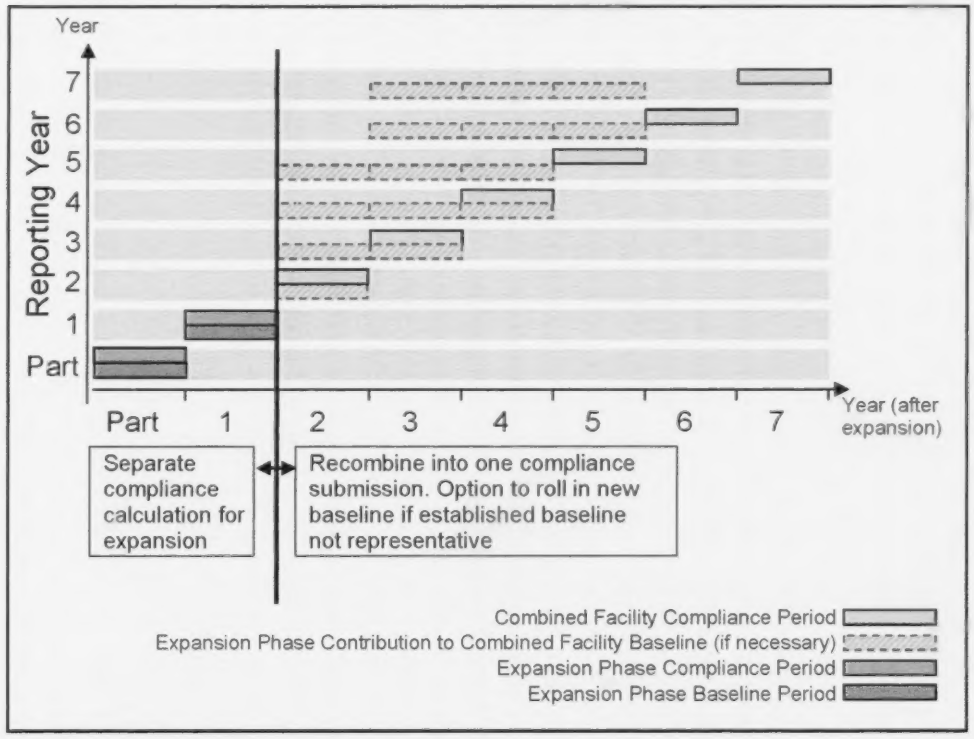


Figure 2: Policy for phased expansion of in situ oil sands facilities.

After the first full year of operation of the expansion, all of the facility's emissions and production are combined into one common compliance submission, as illustrated in Figure 2, using:

1) The original facility's baseline emissions intensity, as long as this is deemed by AESRD to be a valid reference for the whole facility (e.g. if the expansion uses similar technology); or

2) A new combined baseline that is representative of the entire facility, which rolls into a three year production-weighted average. In this case, the expansion portion of the facility may be required to submit a separate compliance report for an additional four years so that the emissions and production from the expansion

phase can be built into the new baseline emissions intensity. See the *Technical Guidance for Completing Baseline Emissions Intensity Applications* document for more detail.

If an expansion occurs during the baseline period for an original facility, the emissions and production associated with the expansion will be excluded from the original facility's baseline emissions intensity calculation.

Note: *Alberta Environment and Sustainable Resource Development maintains the authority to account for significant changes or anomalies in operation on a facility by facility basis, including the ability to update the baseline period for a facility if the approved baseline is not representative.*

3.7.5 Decommissioning

AESRD recognizes that production may decline more rapidly than emissions as some facilities reach the end of their operating life, causing a significant increase in emissions intensity. Regulated facilities with emissions below the threshold level, and where both production and total annual emissions are in decline, causing an increase in emissions intensity and compliance burden, may apply for a special declining production baseline emissions intensity. These situations are handled on a case-by-case basis.

Facilities whose approval status under the *Environmental Protection and Enhancement Act* (EPEA) has been amended to "decommissioned" must notify AESRD in order to be released from the requirements of the *Specified Gas Emitters Regulation*.

Facilities that do not have an EPEA approval must demonstrate to AESRD that no production or direct emissions are occurring or are planned to occur at the facility and that the facility is being decommissioned in order to be released from the requirements of the *Regulation*.

3.7.6 New Facility

New facility treatment recognizes that new facilities are typically built to higher design standards than older facilities. New facility treatment under the *Regulation* recognizes these improvements by assigning a graduated compliance target for new builds. This category only applies to newly built facilities, and does not apply to facilities undergoing major modifications described in Section 3.7.2 above.

More information about the establishment of baseline emissions intensities is provided in the *Technical Guidance for Completing Baseline Emissions Intensity Applications*.

3.8 Compliance Submission Errors

3.8.1 Detection and Correction of Errors

When errors are detected in a facility's annual compliance submission or the associated baseline emissions intensity application, including discrepancies between a compliance

submission and the associated baseline emissions intensity application, the errors must be immediately disclosed to AESRD. Errors may be detected by facilities, third party verifiers, AESRD, or through AESRD's third party audit process.

When errors are identified, AESRD will work with the affected facility to establish the most appropriate corrective action, and will determine whether or not reconciliation of past compliance obligations is required (i.e. adjustment of credits required or emission performance credits granted). The required corrective action will depend on the nature and the magnitude of the error. Typically, **immaterial** errors are corrected on a go-forward basis, and **material** errors require both retroactive and go-forward correction of the data. See Section 9.1.9 for more information about materiality. If a contravention of the CCEMA or SGER is suspected a formal investigation may be conducted, as per 3.8.3.

In cases where errors have a significant effect on a facility's compliance obligation, retroactive reconciliation of the compliance obligation is typically required. Retroactive adjustment of compliance obligations may be made up to a maximum of three compliance periods preceding the most recent submission deadline. For example, after March 31, 2011, adjustment of previous compliance obligations will only be considered for the 2010, 2009, and 2008 compliance periods.

Where retroactive correction of errors is not required, facilities may propose voluntary data corrections. In such cases, AESRD may require third party verification of the correction, depending on the extent of the changes.

Adjustment to past compliance obligations will not be made in situations where facilities update or move to improved calculation methodologies if consistent methodologies were used between the previously accepted baseline and compliance submissions. More information about calculation methodologies can be found in Section 5.3.

Note: *The above error correction policies do not apply where corrections are required as the result of an investigation or offence under the Climate Change and Emissions Management Act. In such cases, the extent of the required correction, reconciliation, or penalties will be determined based on the specific situation.*

3.8.2 Compliance Adjustments

Reconciliation of past compliance obligations will be made through payment into the Climate Change and Emissions Management Fund at the fund price applicable to that compliance period

In cases where adjustment of a facility's past compliance obligation results in over-compliance (i.e. the corrected net emissions intensity, with previously submitted true-up, is less than the facility's net emission intensity limit), reconciliation will occur as follows:

1) If fund credits were purchased for the original true-up, they will be refunded at the value that was originally paid, up to a maximum of the number of fund credits submitted for the facility.

2) If offset credits or emission performance credits were submitted for true-up, and an error correction was made during the facility's compliance review, AESRD will only confirm retirement of the total tonnes of credits required to achieve compliance. Additional credits will remain active on the registry under that facility's name and will be available for use in future compliance periods.

3) If offset credits or emission performance credits were submitted for true-up, and error correction is made after the facility's compliance report was reviewed, accepted as complete and the credits were retired, the retired tonnes will be carried forward to the next compliance period in which credits are required. This carryover is non-transferable and must be used as the first compliance option at the facility.

4) If emission performance credits were requested or generated by the facility, the number of emission performance credits will be adjusted to reflect the corrected compliance report. If the total number of emission performance credits increases, additional credits will be issued. If the total number of emission performance credits decreases and serial numbers have already been issued, some of the previously issued credits will be revoked, and will go through a similar correction process outlined for offset credits in Section 4.3.3.

3.8.3 Investigations and Enforcement of Offences

If there is a suspected contravention of the *Regulation* or the *Act* the facility reviewer will refer the issue to the applicable regional office of Alberta Environment and Sustainable Resource Development. The Climate Change Secretariat will work with the Environmental Protection Officer from the region to assist as a resource in determining if an investigation is necessary, and in the completion of an investigation.

An investigation will occur if there are reasonable grounds to believe that an offence has occurred. If an investigation will occur, a Notice of Investigation will be sent by the investigator to the facility with a copy sent to the Climate Change Secretariat. The Environmental Protection Officer will evaluate evidence of a "due diligence" defence, meaning that *no person can be convicted of an offence if that person establishes on a balance of probabilities that the person took all reasonable steps to prevent its commission.*

Once the investigation is initiated, the Climate Change Secretariat can not communicate with the facility or company regarding information relevant to the investigation, the event(s) leading to the investigation, or the status of the investigation. This communication will only occur with the formal investigation team. The Climate Change Secretariat is still permitted to request information from the facility in regards to completing technical compliance reviews or policy development during an investigation. Further discussion with the facility about the particulars of the investigation, evidence accumulated over the course of an investigation, how to come into compliance after-the-fact, etc. will not be entertained by the Climate Change Secretariat. Facilities will be referred to the investigator of record to discuss all investigative matters.

When the investigation is concluded, a decision will be made on whether enforcement action is appropriate, and what enforcement action should be undertaken. Options include outright closure, written warnings, orders, administrative penalties, and prosecution. The choice of response is predicated on the severity of the offence, whether the offence was knowingly committed, whether the offence is a first-time event or a repeat offence. The Climate Change Secretariat and the facility will be notified of the outcome of the investigation.

4.0 Compliance Options

4.1 Facility Improvements

Facilities are encouraged to implement operational improvements to reduce greenhouse gas emissions relative to production output. Decreases in annual emissions intensity will help facilities to meet their net emissions intensity limit. Facilities that reduce their annual emissions intensity below their net emission intensity limit are eligible to request emission performance credits. More information about emission performance credits is provided in Section 4.2 below.

Examples of facility improvements include:

Example 1: Technology Improvements

Technology improvements can include adapting new technologies that increase energy efficiency, retrofitting existing equipment, and adapting more efficient practices to improve a facility's performance. Improving energy efficiency will often improve emissions intensity, and can also improve competitiveness and productivity over the long-term.

Technology improvements can also be made to reduce the total quantity of greenhouse gas emissions that are released to the atmosphere.

Example 2: Maintenance

Maintenance procedures can be implemented to reduce greenhouse gas emissions. For example, fugitive emissions represent a significant portion of total facility emissions for some industrial operations. Regular maintenance, including leak detection and repair programs, and equipment replacement can often help reduce fugitive emissions without sacrificing production, improving emissions intensity. Note that quantification methods for fugitive emissions must be sufficiently defensible to support greenhouse gas emissions reduction claims.

Example 3: Fuel Switching

The type of fuel used in combustion activities at a facility has a significant effect on the amount of resulting greenhouse gas emissions. Switching to a fuel that releases a smaller quantity of emissions per unit of energy produced can help to reduce annual emissions intensity.

For example, displacing on-site coal combustion with natural gas combustion could potentially help to reduce emissions intensity.

Switching from on-site fuel usage to energy sources with significant indirect emissions (e.g. electricity, steam, or hydrogen) is not considered fuel switching. See Section 3.7.2 for more information.

4.2 Emission Performance Credits

Emission performance credits are issued for reductions of specified gases beyond the reduction requirement at regulated facilities. Emission performance credits may be issued for each tonne of CO_2e that the total annual emissions quantity is less than the product of net emissions intensity limit and total production for the compliance year.

AESRD reviews requests for emission performance credits and, if approved, issues serial numbers for the credits generated. Once serialized, these credits may be banked for use in future compliance cycles, transferred to another regulated facility, or sold.

4.2.1 Generating Emission Performance Credits

Emission performance credits must result from direct, demonstrable improvements to a regulated facility, and cannot be generated through changes in reporting methodology, shifting of emissions upstream or downstream of the facility (i.e. increases in indirect emissions), or short-term fluctuations in facility production. In addition, emission performance credits can only be generated from reductions in emissions that are included in a facility's total annual emissions calculation. Reductions of industrial process emissions, CO_2 emissions from combustion and decomposition of biomass, and indirect emissions do not affect annual emissions intensity, and are not eligible to generate emission performance credits.

Facilities that are eligible to request emission performance credits must include an emission performance credit request form with their compliance submission, and must describe the actions that were taken to improve emissions intensity. Facilities that request emission performance credits may be required to provide detailed information regarding the impact of individual actions on the overall facility performance. AESRD reviews all emission performance requests, and may reject a request, in part or whole, if it is determined that the requested credits did not result from actual facility improvements, do not align with the intent of the *Regulation*, or fail to meet the requirements of the *Regulation*. Emission performance credits may be revoked at any time if it is later determined that they do not meet these requirements.

Once it has been determined that emission performance credits meet the requirements described above and can be approved, facilities are notified in writing.

4.2.2 Emission Performance Credit Serialization and Tracking

Emission performance credits are approved, serialized and tracked using the following process:

1) Facilities that are eligible to request emission performance credits must submit an emission performance credit request form to AESRD with their compliance report submission;
2) AESRD reviews each emission performance request as part of the compliance report review process;

3) Once the compliance report review process is complete, AESRD makes a decision regarding the approval of requested emission performance credits request and notifies the facility in writing;

4) AESRD creates and assigned serial numbers to approved emission performance credits. Notification of serial numbers is provided to facilities;

5) Credit transactions occur as bilateral agreements between buyers and sellers and are tracked on the registry. All documentation associated with the transaction of credits should be kept available;

6) Facilities wishing to submit emission performance credits as a compliance mechanism must place the units in pending retirement on the registry and should include the serial numbers in their compliance form; and

7) AESRD retires the submitted emission performance credits after review of the submitting facility's compliance report.

AESRD has developed a registry for serialization and tracking of emission performance credits, using a similar platform to the current offset registry. Submissions for the 2012 compliance period must continue to submit emission performance credit documentation consistent with Section 3.5 of this guidance document. Once the registry is fully operational, facilities will be notified.

In order to recover costs of providing the registry, fees are associated with certain transactions. A transfer of units from one company to another will be at a fee of $0.02 per unit to the purchasing company and retirement of credits for compliance will be at a fee of $0.05 per unit. A minimum fee of $50 dollars will be applied to all transfers between companies or retirements regardless of the number of units. Transfers of units within the same company or voluntary retirement of units has no associated fee.

Note: *AESRD issues emission performance credits to the facility demonstrating the reductions, and does not track joint venture ownership or other contractual obligations that may affect ownership of credits. It is each facility's responsibility, once emission performance credits have been serialized, to transfer the ownership of credits to appropriate parties.*

4.2.3 Submitting Emission Performance Credits for Compliance

Emission performance credits may only be used once for compliance purposes, and must be serialized before use. All serialized emission performance credits remain valid until they are submitted for compliance, voluntarily retired, or revoked by AESRD.

Ownership and use of emission performance credits must be negotiated through contractual agreements between the parties involved. Emission performance credits must be owned by one of the companies with controlling interest of, and must be allocated to, the facility submitting them for compliance.

4.3 Offset Credits

Emission offset credits are generated through reductions of specified gases resulting from activities not covered by the *Regulation* or otherwise required by law. The intent of the Alberta offset system is to encourage voluntary emissions reductions that would not otherwise have occurred. Offset credits cannot be generated from reductions that occur at regulated facilities.

Section 7 of the *Specified Gas Emitters Regulation* requires that offset credits meet the following eligibility criteria to be considered valid for use as a compliance option. The reductions must:

- Occur in Alberta;
- Result from actions not otherwise required by law;
- Result from actions taken on or after January 1, 2002;
- Occur on or after January 1, 2002;
- Be real, demonstrable, and quantifiable;
- Have clearly established ownership; and
- Be counted once for compliance purposes.

In addition to the requirements stated above, AESRD also requires that offset projects be:

- Implemented according to a quantification protocol approved by AESRD;
- Be third party verified by a qualified person meeting the requirements for a third party auditor described in section 18 of the *Specified Gas Emitters Regulation*; and
- Be registered on the Alberta Emissions Offset Registry.

More information about the offset protocol development process and the offset project development process can be found in the *Technical Guidance for Offset Protocol Developers* and in the *Technical Guidance for Offset Project Developers* available on AESRD's website at http://environment.alberta.ca/02275.html.

4.3.1 Offset Project Documentation

Offset projects must be registered on the offset registry, and the following project documentation must be provided before the credits are serialized:

- Offset project plan;
- Offset project report for the applicable crediting period;
- Greenhouse gas assertion (notice of creation) for the applicable crediting period;
- Verification Report for the applicable crediting period, including:
    - Signed conflict of interest checklist,

- Signed statement of qualifications, and
- Signed statement of verification.

These documents are displayed on the registry and serve as a permanent reference for the offset project. Having these documents publicly available does not replace a company's due diligence during offset credit transactions. Companies are encouraged to perform their own research and analysis when purchasing offset credits.

4.3.2 Submitting Offset Credits for Compliance

Companies submitting offset credits for compliance with the Regulation must request retirement for the serial ranges being submitted. The registry will issue a confirmation of initiation of retirement letter to the company. This letter must be submitted to AESRD as part of the facility's compliance submission. AESRD will confirm final retirement of the offset credits as part of the facility's compliance review.

Facilities submitting offset credits for compliance with the *Regulation* are responsible for confirming that all required documentation for the offset project is available on the registry. Offset credits with incomplete supporting information will not be accepted for compliance purposes.

The Alberta Emissions Offset Registry processes all requests for retirement in the order that they are received. Project developers and regulated facilities are encouraged to submit all project documentation, including requests for retirement, as early as possible to allow sufficient time to process the request. The registry will try to process all requests before the compliance deadline, but cannot guarantee processing of requests submitted after March 1 for use in the current compliance year. Offset credits that have not been serialized or have not been initiated for retirement will not be accepted for compliance.

4.3.3 Offset Credit Error Correction

AESRD reviews all offset projects that are submitted for compliance and conducts an audit on a portion of these credits. Where errors or discrepancies are detected, AESRD will contact the project developer to determine an appropriate path forward. All identified discrepancies are assessed on a case-by-case basis, and the required corrective action will depend on the nature and the magnitude of the error. Typically, **immaterial** errors are corrected on a go-forward basis, and **material** errors require both retroactive and go-forward correction. See Section 9.1.9 for more information about materiality.

When retroactive correction is required, the project developer and affected facilities are notified, and the offset project is flagged on the registry so that no further transactions are permitted until all issues have been resolved and the project meets Alberta offset system requirements. The project developer then has until the following March 1 to make the required corrections. Revised projects must undergo a complete verification, using a verifier determined by AESRD. If the revised project is verified and submitted by March 1, adjustments are made on the registry, which may include a portion of the offset credits being removed, and the remaining offset credits being made available for use.

If the project cannot be corrected by the March 1 deadline, all offset credits associated with that project will be revoked and removed from the registry. The project developer will then have one additional year, until March 1 of the following year, to make the required corrections and successfully complete a verification using a verifier appointed by AESRD. If the verification is completed successfully, the revised credits will be available for use in future compliance cycles.

Projects that cannot be resolved within the timeline above will be permanently removed from the Alberta offset system.

Whenever offset credits are revoked or removed from the registry, affected facilities are required to replace the credits through payment into the Climate Change and Emissions Management Fund at the fund credit price applicable to the compliance year for which the credits were submitted.

Corrections to serialized offset credits are applied in the following manner:

- Corrections are attributed to the serial number range(s) in which the problem occurred. Credits are retracted or revoked proportionally across the vintage years to which the correction applies, unless finer serial number division is available.
- Corrections are first applied to any un-purchased tonnes held by the project developer.
- If the project developer does not hold sufficient tonnes to account for the entire correction, remaining corrections are assigned proportionally to all parties owning offset credits in the affected serial range(s).
- If unretired offset credits are owned in the affected serial range, corrections are first taken from unretired tonnes.
- Shortfalls that apply to offset credits already submitted for compliance under the *Regulation* are allocated in proportion to the amount of tonnage used in each compliance year for each facility that submitted the credits.

Corrective actions between buyers and sellers of offset credits are determined through contractual arrangements between the two parties and are outside the scope of the *Regulation*.

If AESRD becomes aware of fraudulent behaviour, including but not limited to double counting or deliberate misrepresentation of greenhouse gas emissions reductions, appropriate action will be taken, and may include, without limitation, revoking all offset credits associated with the project.

4.4 Climate Change and Emissions Management Fund Credits

A facility may also achieve compliance with its emissions reduction obligation by purchasing Climate Change and Emissions Management Fund credits (fund credits), where one credit is equal to one tonne of CO_2e. Fund credits must be purchased on or

before the compliance submission deadline for use toward a facility's compliance obligation, and can only be purchased in whole units. The cost of fund credits is currently set at $15 per tonne of CO_2e, and is subject to change in the future. Fund credits cannot be banked or traded, and must be submitted for compliance true-up upon purchase.

Fund credits are purchased from the **Government of Alberta, Financial Services Branch, Alberta Environment and Sustainable Resource Development**. Fund credit payments must be accompanied by a fund credit purchase form. For each purchase, the dollar value stated on this form must match the dollar value paid to the Government of Alberta.

Facilities wishing to purchase fund credits should:

1. Calculate number of whole tonnes of CO_2e required to achieve compliance, and the portion that will be achieved through fund credits;
2. Calculate the total value of the fund credits being purchased at a cost of $15 per tonne CO_2e owed using the fund credit purchase form, available in the SGER consolidated reporting form;
3. Submit a cheque payment made payable to "Government of Alberta" and the fund credit purchase form to:

   Government of Alberta
   Financial Services Branch
   AESRD
   6th floor, South Petroleum Plaza
   9915 108 Street NW
   Edmonton, Alberta
   T5K 2G8

4. Or, submit payment by electronic fund transfer using the following details, and provide the fund credit purchase form at least three business days in advance of the electronic funds transfer.

Account Name	Climate Change and Emissions Management
Bank Name	CIBC
Bank Address	10102 Jasper Avenue Edmonton
Institution Number	0010
Transit Number	00059
Account Number	92-74219
Ministry/Department	AESRD/Financial Services Branch
Department Contact	Sandra Moore
E-mail	Sandra.moore@gov.ab.ca
Phone Number	780-427-9110

After payment has been submitted, the following will occur:

1. The Financial Services Branch will stamp the fund credit purchase form with a receipt number within 10 working days of receiving the payment; and
2. The stamped fund credit purchase form will be sent to the facility as a purchase receipt. A copy of the purchase receipt will be forwarded to the Climate Change Secretariat and added to the facility's compliance submission.

Companies may purchase fund credits for one or more regulated facilities owned by the same company at the same time by submitting a cheque for the total number of CO_2e equivalent units required. One completed purchase form for the entire purchase must be included with the payment. This form must allocate all purchased fund credits to the facilities submitting them for compliance. The submitted fund credit purchase form will be stamped with a fund credit receipt number and will function as a purchase receipt for all facilities included in the payment.

5.0 Estimation and Reporting of Specified Gases

The *Specified Gas Emitters Regulation* applies to any facility that has released 100,000 tonnes or more of CO_2e in any year since 2003 based on the sum of direct emissions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6). Table 2 provides a list of the specified gases covered under the *Regulation* and each associated 100-year global warming potential used to calculate CO_2e emissions.

Specified Gas	Formula	100-year GWP
Carbon dioxide	CO_2	1
Methane	CH_4	21
Nitrous Oxide	N_2O	310
Sulphur Hexafluoride	SF_6	23900
Perfluorocarbons (PFC)		
Perfluoromethane	CF_4	6500
Perfluoroethane	C_2F_6	9200
Perfluoropropane	C_3F_8	7000
Perfluorobutane	C_4F_{10}	7000
Perfluorocyclobutane	c-C_4F_8	8700
Perfluoropentane	C_5F_{12}	7500
Perfluorohexane	C_6F_{14}	7400
Hydrofluorocarbons (HFC)		
HFC-23	CHF_3	11700
HFC-32	CH_2F_2	650
HFC-41	CH_3F	150
HFC-43-10mee	$C_5H_2F_{10}$ (structure: $CF_3CHFCHFCF_2CF_3$)	1300
HFC-125	C_2HF_5	2800
HFC-134	$C_2H_2F_4$ (structure: CHF_2CHF_2)	1000
HFC-134a	$C_2H_2F_4$ (structure: CH_2FCF_3)	1300
HFC-143	$C_2H_3F_3$ (structure: CHF_2CH_2F)	300
HFC-143a	$C_2H_3F_3$ (structure: CF_3CH_3)	3800
HFC-152a	$C_2H_4F_2$ (structure: CH_3CHF_2)	140
HFC-227ea	C_3HF_7 (structure: CF_3CHFCF_3)	2900
HFC-236fa	$C_3H_2F_6$ (structure: $CF_3CH_2CF_3$)	6300
HFC-245ca	$C_3H_3F_5$ (structure: $CH_2FCF_2CHF_2$)	560

Table 2: Specified gases and gas species subject to the *Regulation*.

5.1 Emission Source Categories

Source categories have been established to provide additional information regarding greenhouse gas emissions in Alberta and to facilitate special treatment of certain types of emissions (e.g. exclusion of industrial process emissions from the annual emissions

intensity calculation). Details regarding each source category are provided in Sections 5.1.1 through 5.1.10 below.

Emissions of CO_2, CH_4, and N_2O must be disaggregated and reported according to the following source categories:

- Stationary Fuel Combustion
- Industrial Process
- Venting
- Flaring
- Other /Fugitive
- On-site Transportation
- Waste and Wastewater
- Formation CO_2
- CO_2 from Combustion of Biomass
- CO_2 from Decomposition of Biomass

Source Category	Specified Gas	Reported	Total Direct Emissions (TDE)	Total Annual Emissions (TAE)
Industrial Process	All	✓	✓	×
Industrial Product Use	HFC, PFC, SF_6	✓	✓	✓
Stationary Fuel Combustion	CO_2, CH_4, N_2O	✓	✓	✓
Venting	CO_2, CH_4, N_2O	✓	✓	✓
Flaring	CO_2, CH_4, N_2O	✓	✓	✓
Other/Fugitive	CO_2, CH_4, N_2O	✓	✓	✓
Waste and Wastewater	CO_2, CH_4, N_2O	✓	✓	✓
On-site Transportation	CO_2, CH_4, N_2O	✓	✓	✓
Formation CO_2	CO_2	✓	✓	✓
CO_2 from Combustion of Biomass	CO_2	✓	✓	×
CO_2 from Decomposition of Biomass	CO_2	✓	✓	×

Table 3: Summary of the Specified Gas Emitters Regulation reporting requirements by source category and specified gas.

Emissions of HFC, PFC, and SF_6 must be disaggregated and reported according to the following source categories:

- Industrial Process
- Industrial Product Use (release of emissions that do not qualify as Industrial Process)

Table 3 provides an overview of the greenhouse gas types that must be reported for each source category and whether the associated emissions are included in the total direct emissions and total annual emissions calculations.

5.1.1 Stationary Fuel Combustion

Stationary fuel combustion emissions are direct emissions resulting from non-vehicular combustion of fuel for the purpose of energy production (e.g. to generate electricity, heat or steam), and include emissions from waste combustion/incineration where waste materials are used directly as a fuel or converted to fuel for the purpose of energy production. Stationary fuel combustion is a common source of greenhouse gas emissions and is found in most industrial sectors.

Emissions of N_2O and CH_4 from combustion of biomass are included in the stationary fuel combustion category if the combustion is used for energy production.

5.1.2 Industrial Process

Industrial process emissions are direct emissions from an industrial process involving chemical or physical reactions other than combustion, and where the primary purpose of the industrial process is not energy production. Industrial process emissions are not found in all industrial sectors.

This source category applies to industrial processes that are integral to facility production where the only option for reducing the emissions is to scale back production. Where an industrial process involves multiple emissions sources that can be quantified separately, only the emissions meeting the definition of industrial process can be included in this category. If the product of an industrial process is combusted or vented (e.g. hydrogen being used as a fuel or flared or vented rather than as a process feed stock) the emissions associated with that product are not considered industrial process emissions, and must be reported under the most appropriate emissions category.

Industrial process emissions are included in the threshold emissions calculation, but are excluded from the total annual emissions calculation. AESRD is reviewing the treatment of the industrial process source category and may introduce a reduction target on these emissions for future compliance.

Examples of industrial process emissions include:

- **Hydrogen production**: steam-methane reforming and shift reactions
  - Primary reforming: $CH_4 + H_2O \rightarrow CO + 3\ H_2$
  - Secondary reforming: $CO + 0.5\ O_2 \rightarrow CO_2$
  - Shift reaction: $CO + H_2O \rightarrow CO_2 + H_2$

- **Decomposition of carbonates**:
  - Calcination of limestone: $CaCO_3 \rightarrow CaO + CO_2$
  - Calcination of magnesium carbonate: $MgCO_3 \rightarrow MgO + CO_2$

- Acid leaching of carbonate rock: $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + CO_2 + H_2O$
- Demineralization of water: $HCO_3^- + \text{acid} \rightarrow CO_2 + H_2O$
- Use of limestone as flux: $CaCO_3 + FeS + 1.5\ O_2 \rightarrow Fe + CaSO_4 + CO_2$

- **Use of carbon as reductant for metal oxides**:
  - Carbon as a reductant for steelmaking: $3\ C + 2\ Fe_2O_3 \rightarrow 4\ Fe + 3\ CO_2$

- **Oxidation of process materials**
  - oxidation of ethylene: $C_2H_4 + 0.5\ O_2 \rightarrow C_2H_4O, CO_2, H_2O$
  - oxidation of ammonia: $NH_3 + 2\ O_2 \rightarrow HNO_3 + H_2O + NO_x, N_2O$

- **N_2O from nitric acid production**

Facilities that are unclear on whether an emissions source meets the definition of industrial process emissions should discuss with AESRD before submitting their compliance report.

5.1.3 Venting

Venting emissions are direct emissions from intentional releases to the atmosphere of a waste gas or liquid stream. Examples include: casing gas emissions; treater, stabilizer, dehydrator off-gas; vented blanket gas; emissions from pneumatic devices that use natural gas as a driver; and compressor start-up venting. Formation CO_2 emissions are not included in this source category.

5.1.4 Flaring

Flaring emissions are direct emissions from the controlled combustion of a gas or liquid stream produced on site, but not for the purpose of energy production, and include, without limitation, emissions from waste petroleum incineration, hazardous emissions prevention systems (in pilot or active mode), flare purge gas, well testing, natural gas gathering systems, processing plant operations, crude oil production, pipeline operations, petroleum refining, chemical fertilizer production, and steel production. The flaring category does not include emissions from combustion of biomass or landfill gas.

5.1.5 Other/Fugitive

Fugitive/other emissions are direct emissions that do not fit into the stationary fuel combustion, industrial process, venting, flaring, on-site transportation, waste and wastewater, formation CO_2, CO_2 from combustion of biomass, or CO_2 from decomposition of biomass categories, and include, without limitation, intentional or unintentional releases of gases arising from the production, processing, transmission, storage and use of solid, liquid or gaseous fuels.

In general, fugitive/other emissions result from the handling or processing of various types of fuel in the fossil fuel industry. Fugitive/other sources include leaks from natural gas transmission lines and processing plants, accidental releases from oil and gas wells, and releases from the mining and handling of coal.

5.1.6 Formation CO_2

Formation CO_2 emissions are direct emissions of CO_2 that are recovered or are recoverable from an underground reservoir and are gaseous at conditions under which its volume is measured or estimated. This source category includes CO_2 venting from gas sweetening.

5.1.7 Waste and Wastewater

Waste and wastewater emissions are direct emissions from on-site waste disposal and waste/wastewater treatment, and include emissions from landfilling of solid waste, flaring of landfill gas, treatment of liquid waste, and waste incineration, but exclude emissions from waste-to-energy operations and CO_2 emissions from decomposition and combustion of biomass.

Emissions of CH_4 and N_2O from combustion or decomposition of biomass and landfill gas are to be reported in the Waste and Wastewater category if the combustion is not for energy production. Emissions of CH_4 and N_2O from the combustion of biomass for energy (including heat) are to be included in the stationary fuel combustion category.

5.1.8 On-site Transportation

On-site transportation emissions are direct emissions resulting from fuel combustion in machinery used for the on-site transportation of products and materials integral to the production process. Examples of on-site transportation include:

- Transportation of raw or intermediate products and materials within the production process such as equipment used at an oil sands operation to mine and/or move materials to subsequent on-site processing;
- Equipment used at above or below ground mining operations to mine and/or move mined materials;
- Equipment used to transport intermediate products or materials to different on-site production processes;
- Equipment used to handle or load final product for transport, including movement or management of inventory prior to final shipment outside of facility boundaries; and
- Transportation of bi-products or wastes, such as mining overburden or tailings.

On-site vehicle emissions associated with emergency vehicles, staff transportation, and maintenance may optionally be excluded from the total direct emissions and total annual emissions calculations, but must be excluded or included consistently between the approved baseline emissions intensity application and associated compliance reports for each facility.

5.1.9 CO_2 from Combustion of Biomass

Carbon dioxide emissions from combustion of biomass are included in this category. Biomass includes wood and wood products, charcoal, agricultural residues, trees, crops,

grasses, tree litter, roots, municipal and industrial wastes where the organic material is biological in origin, landfill gas, bio-alcohols, black liquor, sludge gas, and animal or plant-derived oils. Emissions from this source category are included in the total direct emissions calculations, but not in the total annual emissions calculation.

Emissions of CH_4 and N_2O from combustion of biomass are included in either the stationary fuel combustion category or the waste and wastewater category.

5.1.10 CO_2 from Decomposition of Biomass

Carbon dioxide emissions resulting from decomposition of biomass are included in the threshold determination and total direct emissions calculations, but not in the total annual emissions calculation.

Emissions of CH_4 and N_2O from waste decomposition are included in the waste and wastewater category.

5.2 Reporting of Hydrofluorocarbons (HFC), Perfluorocarbons (PFC) and Sulphur hexafluoride (SF_6)

Hydrofluorocarbon (HFCs), perfluorocarbon (PFCs), and sulphur hexafluoride (SF_6) emissions occur in small volumes relative to the principle specified gases—carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O)—but have high global warming potentials. Consequently, AESRD requires all emissions of HFCs, PFCs, and SF_6 associated with facility production to be calculated and reported according to the following source categories:

1) **Industrial Process**: The same description of industrial process emissions in Section 5.1.2 above applies for emissions of HFCs, PFCs, and SF_6. Industrial process emissions of HFCs, PFCs, and SF_6 are also not included in the total annual emissions calculation; and
2) **Industrial Product Use**: Industrial product use emissions are all emissions of HFCs, PFCs, and SF_6 associated with production that do not meet the definition of industrial process, and are included in the total annual emissions calculation.

Emissions of HFC, PFC, and SF_6 associated with emergency equipment and other sources not related to production are excluded from the threshold and emissions calculations. For example, emissions from air conditioning equipment are to be included if from mobile equipment used to haul product, but are exempt for the office refrigerators and office air conditioners. In cases where it is unclear which category emissions of HFC, PFC, and SF_6 belong to, AESRD should be contacted to discuss the matter.

5.2.1 Hydrofluorocarbon (HFC)

Hydrofluorocarbons are a family of synthetic gases that contain carbon, hydrogen and fluorine. Although emissions of hydrofluorocarbons are usually very small, species of

HFC often have very large global warming potentials, ranging from 140 to 11700 times that of carbon dioxide (see Table 2).

Examples of HFC sources from industrial product use include emissions from foam blowing and use of HFC as a cover gas in metal production.

5.2.2 Perfluorocarbon (PFC)

Perfluorocarbons are a family of industrial gases. Although emissions of PFC are usually very small, species of PFC have significant global warming potentials ranging from 6500 to 9200 times that of carbon dioxide (see Table 2).

Examples of PFC sources from industrial product use include emissions from aluminum production and foam blowing.

5.2.3 Sulphur Hexafluoride (SF_6)

Sulphur hexafluoride is a synthetic gas that is relatively inert due to its specific chemical properties. Emissions of SF_6 are usually small, but have a significant global warming potential of 23,900 times that of carbon dioxide (see Table 2).

Examples of SF_6 emissions from industrial product use include emissions of SF_6 used as a cover gas in magnesium smelting and casting, as foundry products in the aluminum industry, and as an insulating gas in electrical equipment such as circuit breakers and on-site power stations.

5.3 Captured CO_2

AESRD is collecting CO_2 data for activities related to carbon capture. Reductions of CO_2 emissions from carbon capture at a regulated facility, with permanent sequestration outside the facility boundary, may be eligible for generation of emissions offset credits using an approved quantification protocol, but are not recognized as an emissions reduction at the capture facility. AESRD will only recognize captured CO_2 as an emissions reduction once it has been permanently sequestered. As such, all captured CO_2 at a regulated facility must be reported as an emission in the category it would have otherwise been reported if it had not been captured.

In addition, the following specific quantities must be reported as part of each SGER compliance report:

1) CO_2 geologically injected on site – carbon dioxide that has been injected into a geological formation from an injection point within the facility boundaries, including CO_2 injected for enhanced oil or gas recovery, acid gas disposal, or CO_2 storage;

2) CO_2 received on site – carbon dioxide that has been received at the facility from an off-site location. This includes CO_2 used as a process feedstock, but does not include trace CO_2 in fuels, feedstock or products; and

3) CO_2 sent off site – carbon dioxide that has not been emitted to the atmosphere and has been sent from the facility to an off-site location, including CO_2 sent off-site as waste, or sold as a product. This does not include trace CO_2 in products.

Note: *The above data fields are not included in the calculation of total annual emissions, total production, or annual emissions intensity. However, all CO_2 that is sent off site must be reported in the appropriate emissions source category, and is included in the total annual emissions calculation.*

5.4 Indirect Emission Sources

Indirect emissions are those emissions associated with the use or purchase of a product. Large changes in the quantity of indirect emission sources (e.g. steam, electricity, hydrogen) can have a significant impact on a facility's emissions intensity. While indirect emissions are not accounted for in the total annual emissions, annual emissions intensity, or compliance obligation calculations, they are considered when determining if emission performance credits are issued, or if a baseline emissions intensity adjustment is requested or required.

5.5 Negligible Emissions

Negligible emissions are direct emissions from on-site sources that are very small in magnitude and are not expected to increase or vary significantly on an annual basis, such as start up of back up power generators for maintenance purposes. For inventory completeness, ongoing, expected and predictable activities such as kerosene consumption for building heat should be captured in the appropriate source category rather than negligible emissions. The negligibility threshold has been set at the **lesser** of 1000 tonnes CO_2e or 1 per cent of a facility's total annual emissions, on an aggregate basis.

If the aggregate emissions total from all sources deemed to be negligible falls below the threshold, these emissions may be excluded from the total annual emissions calculation. Facilities should be aware of any changes to negligible sources that may increase emissions beyond the negligibility threshold and must notify AESRD of any such changes. AESRD may periodically request re-evaluation of a facility's negligible sources to ensure that they remain below the negligibility threshold.

If negligible emission sources exist at a facility, the following information must be provided:

In the baseline emissions intensity application:

- A conservative estimate of the magnitude and annual variation of each emission source to be treated as negligible. If this was not provided in the application for the approved baseline emissions intensity, it should be provided in the next annual compliance report.

In each annual compliance report:

- A list of on-site sources that existed in the compliance period that are deemed to be negligible and confirmation that these sources have not changed significantly; and
- A conservative estimate, as above, for any sources present in the compliance period that were not present in the baseline period.

5.6 Emissions Quantification Methodologies

Note: *It has been brought to our attention that there is a problem with the derivation of the CO_2 emissions factor for gas turbines and reciprocating engines in tables 3.1-2a, 3.2-1, 3.2-2 and 3.2-3 of EPA's AP 42 as well as emissions factors taken from this source including those in Table 1-6 of CAPP's 2003 Calculating Greenhouse Gas Emissions.*

As a reminder, AESRD expects the use of data and calculation methods of highest accuracy available, including the use of fuel gas analysis and mole balances instead of generic emissions factors where available. The AP 42 internal combustion factor is given as 110 lb/10^6 Btu which is not physically possible for natural gas (factor for pure methane would be approximately 115 lb MMBtu). For reference the AP 42 table 1.4-2 value for external natural gas combustion is 120,000 lb 10^6 scf or 118 lb/10^6 Btu at a heating value of 1,020 Btu scf. This issue has been identified to the EPA; they recognize the problem and are looking into it. In the meantime, for 2011 compliance and periods moving forward, we require the substitution of another recognized natural gas CO_2 emissions factor of the facilities choice.

If this EPA turbine or reciprocating engine emissions factor was used in establishing the facility baseline please contact AESRD.

Facilities **must** use the same calculation methodologies for annual compliance reports that were used in the approved baseline emissions intensity application, including emission factors, energy equivalence factors, and unit conversions. Facilities are also responsible for ensuring that consistent methods have been used to calculate input data taken from other parts of the operation such as production accounting data.

If facilities wish to change or update calculation methodologies to produce a more accurate emissions and production inventory for future compliance report submissions, they should contact AESRD as soon as possible to discuss the most appropriate path forward. In such cases, restatement of the baseline emissions intensity will likely be required before the new methodology can be used for completion of annual compliance reports.

In cases where previously used methodologies are unavailable or must be changed for completion of the annual compliance report (e.g. due to changes in metering, temporary data unavailability, etc.), AESRD should be informed before submission of the affected compliance reports. Depending on the nature and the extent of the change, restatement of the baseline emissions intensity may be required.

More information regarding choice of calculation methodologies and relative accuracy can be found in the *Technical Guidance for Completing Baseline Emissions Intensity Applications* document.

5.7 Quantification Methodology Document

Starting for the 2012 compliance period, all facilities must provide a quantification methodology document containing the information outlined below in section 5.7.1 as part of their annual compliance submission. This document provides an explanation of the facilities operations, processes, boundaries, and the methods and assumptions used to quantify the reported emissions intensity. The purpose of this document is to provide an accurate, transparent and complete overview of the facility's greenhouse gas emission sources and methodologies used to estimate the reported emissions intensity. The use of a standardized format will improve the efficiency of verification, review and audits.

5.7.1 Format for Standardized Quantification Methodology Document

Facilities are recommended to use the following outline for the quantification methodology document. Use of this format will be required for the 2013 compliance year. Additional sections may be included at the end of the document.

1) Facility overview:
    a. Facility name, as it appears in Section A1 of the compliance report.
    b. Approved baseline emission intensity, including date of approval.
    c. Facility boundary description – Include the EPEA approval number, EUB number, a description of which operations are included in the compliance report, justification for all excluded operations, and a description of any changes to the facility boundary that have occurred since the baseline period.
    d. Description of site processes and a complete list of emission sources. Include a simplified process flow diagram(s) showing major process elements, emissions sources, product flows, energy sources and flows, fuel flows by type, and identifying measurement points for both flow and composition.
    e. Changes from baseline – Describe any changes to facility equipment, operations, or production that affect the reported emissions, production, or emissions intensity by 10% or more. These changes must also be reported in Section A3 of the compliance report.
2) Simplified process flow diagram(s) that provides an overview of the facility operations, shows the major material flows, and shows emission sources labelled by source category.
3) Emission source categories – For each fuel/energy source, provide:
    a. A list of equipment units for major greenhouse gas emissions sources using that fuel, including the unit name and number that is used in the data management system.

b. An explanation of how the fuel/energy is received on site, where it is used and how the final use is determined (i.e. directly measured, allocated, invoiced). Provide supporting information such as:

   i. A simplified fuel flow diagram showing fuel sources, applicable key meters, gauges, product analyzers, sampling points, and fuel/production receipt and disposition points. This diagram is useful to facilities, verifiers, and AESRD, and facilities are encouraged to develop and include these diagrams.

   ii. The sampling procedure and frequency when fuel analysis is used for the quantification of fuel use emissions.

c. The emission calculation equations used, including a listing of activity data, emissions factors including an example calculation and a list of the approved reference sources for the calculation and factors.

d. Any assumptions used during the calculation (e.g. combustion efficiency, control efficiency, thermal efficiency, etc.), including an explanation.

4) Meter calibration procedure and schedule – List key measurement device(s), provide documentation showing maximum uncertainty of key measurement devices. For each measurement device used for SGER reporting purposes, describe the operating procedures for:

   a. Calibration and Proving –outline the frequency and method of calibration, checking, or proving.

   b. Gauging – Outline the method of gauging tanks/storage ponds/vessels and the frequency of calibrating applicable gauging devices.

   c. Trucking – Outline the method(s) of measuring, sampling, and recording production moved by truck to or from the facilities associated with the scheme.

   d. For non-combustion emissions categories describe the emission calculation equations used, including a listing of activity data, frequency of any measurements, method of averaging or annual roll up, emissions factors including an example calculation and a list of the approved reference sources for the calculation and factors.

5) Description and justification for any methodology changes from the baseline period,

6) Explain averaging method where multiple raw data sources are rolled up prior to quantification of emissions. The weighted average method is preferred. If a straight average method is used provide justification. An example would be how hourly gas analysis data is used.

7) Data management system – Include a brief explanation of how raw data moves through the system, into the compliance report, and what controls are used. Additionally, provide a brief description of how a fuel/energy source (purchased or produced) is tracked and allocated to the final emission source and rolled up to the source category (e.g. onsite transportation, stationary fuel combustion, etc.) and if these volumes are reconciled back or checked against the invoice and production meters. Facilities are encouraged to use a data flow diagram to display the logic of the

data sources and how data flows from raw sources through calculation logic and quality assurance systems.

a. Include important meter tag identification numbers, with a brief description on where they are used.

b. Virtual tag expressions (list the formulas that are embedded within the Information Management System for automated calculations) are optional in the quantification methodology document, but will likely be required by the verifier and auditor.

c. A description of data and information controls used by the organization, as well as quality assurance and quality control activities used in the preparation of the compliance report is recommended to assist verifiers.

8) Production – List the facility's products and explain how they are quantified, and aggregated to calculate total production including a description of where production data (quantity and composition) is measured (e.g. oil equivalent factors) Production is described in Section 6.3.

9) Cogeneration – If a cogeneration unit is present on site, provide an explanation of the system in place, its inputs and how the steam and power are used. Include a simple conceptual / logic diagram, a summary of the energy balance and an explanation of how heat calculations are done, including enthalpies. For each of the various thermal streams provide annualized flow averages, temperature averages, and pressure averages. If fuel factors were used to calculate the greenhouse gas emissions from integrated cogeneration, provide the factors used including references. If fuel analysis was used to calculate greenhouse gas emissions from integrated cogeneration, provide a synopsis of the fuel analysis. Fuel compositions and a summary of the relevant data used in the emissions calculation can also be provided.

10) Negligible emission sources – Include the calculation used to estimate the magnitude of each potentially negligible emission source, and justification for the omission of any sources. This should be carried forward from your baseline submission.

11) Conversions Page – Show any repeated calculations or conversions that are used.

12) Other – Any further information that assists in explaining the greenhouse gas calculations for the facility (e.g. a list of facility specific acronyms).

6.0 Calculating Emissions, Production and Emissions Intensity

The process and formulae for calculating a facility's annual emissions, production, emissions intensity, and compliance obligation are provided in this section. The final calculations in the compliance report form are calculated automatically using data that is input by the facility. This section is intended to assist facilities in understanding how the calculations are completed and in verifying the calculated information internally before submitting their compliance reports to AESRD.

6.1 Total Direct Emissions

The total direct emissions value is the sum of all direct greenhouse gas emissions at a facility expressed in carbon dioxide equivalent tonnes (tonnes CO_2e). The total direct emissions value is calculated by summing the CO_2e emissions value for each greenhouse gas type reported in each source category.

6.2 Total Annual Emissions

The total annual emissions value is the sum of all direct greenhouse gas emissions, excluding industrial process emissions, CO_2 from biomass combustion, and CO_2 from biomass decomposition, expressed in tonnes CO_2e.

6.3 Total Production

The production value is the total annual quantity of saleable output, except where an output is not produced (e.g. landfills). Each facility must determine an appropriate production metric during the establishment of its baseline emissions intensity. More information about the choice of production metrics is provided in the *Technical Guidance for Completing Baseline Emissions Intensity Applications*.

Facilities **must** use the same production metric for their annual compliance reports as was used in the approved baseline emissions intensity application. AESRD may require the use of a different production metric if it is determined that the current metric does not align with the criteria described above.

Facilities that produce multiple distinct products must report all products separately in the units measured on site, and provide detailed, transparent calculations for how these products are converted into a single denominator for the facility's emissions intensity. For example a facility whose product is diluted bitumen should report the quantity of diluent and bitumen included in the denominator and any conversion factor used to obtain common units. End products or by-products that are excluded from the intensity denominator (such as sulphur or petroleum coke at some facilities) must still be reported and explicitly given a zero weighting, with appropriate justification in the methodology document. Treatment of by-products should be discussed with AESRD as part of the baseline setting process.

If a facility has an intensity weighted multiproduct treatment the conversion factor set by the director should be entered in the weighting column of Section B6. These weightings take the place of a facility's baseline emissions intensity. These facilities will enter a 1 in the baseline emissions intensity field in Section E1.

Note: *AESRD has accepted some facility compliance submissions using alternate production metrics to calculate production. These include refinery activity index (RAI) and inlet gas. Use of these alternates is being reviewed to better understand their relevance, appropriateness, and applicability to reduction targets. Facilities using these alternate denominator metrics must also submit actual production data with their annual compliance reports.*

6.4 Emissions Intensity

Emissions Intensity is a measure of the greenhouse gas emissions required to produce each unit of production on an annual basis, and is calculated as the ratio of total annual emissions to production, as follows:

$$EI = TAE / P$$

Where:

EI is annual emissions intensity
TAE is total annual emissions, and
P is total annual production.

The emissions intensity and the values discussed in the following subsections are calculated differently for facilities with cogeneration. More information regarding integrated and stand-alone cogeneration calculations is provided in Section 7.0.

6.5 Net Emissions Intensity Limit

For each compliance period, regulated facilities are assigned net emissions intensity limits based on their reduction target and approved baseline emission intensity. The reduction target is 12 per cent for established facilities, and depends on the number commercial operation years for new facilities (see Table 1). The net emissions intensity limit is calculated as follows:

$$NEIL = BEI \times (1 - T)$$

Where:

NEIL is the net emissions intensity limit
BEI is the approved baseline emissions intensity, and
T is reduction target.

6.6 Credit Calculation

Facilities whose emissions intensity exceeds their net emissions intensity limit are required to submit credits such that the net emissions intensity is equal to or less than the net emissions intensity limit. Facilities whose annual emissions intensity is lower than their net emissions intensity limit are eligible to request emission performance credits. The following formula is used to determine the number of credits that must be purchased to achieve compliance or the number of emission performance credits that may be requested:

$$C = TAE - (NEIL \times P)$$

Where:

C (in tonnes CO_2e) is the facility compliance obligation:

if C is positive, it represents the number of credits required to achieve compliance

if C is negative, it represents the number of emission performance credits eligible to be requested

TAE is total annual emission

NEIL is net emissions intensity limit, and

P is total annual production.

The compliance (C) value is always rounded to the nearest integer value in tonnes CO_2e. Fund credits, offset credits and emission performance credits cannot be created or submitted in partial units. For example, a value of 100.4 tonnes CO_2e will round down to 100 tonnes CO_2e and 100.5 tonnes CO_2e will round up to 101 credits.

6.7 Net Emissions Intensity Calculation

The facility's net emissions intensity for January 1 to December 31, including compliance actions taken, is compared with the facility's net emissions intensity limit to determine whether the facility has met its reduction obligation for the compliance period. The net emissions intensity is calculated using the following the formula:

$$NEI = (TAE - OC - FC - EPC) / P$$

Where:

NEI is net emissions intensity

TAE is total annual emissions

OC is offset credits

FC is fund credits

EPC is emission performance credits, and

P is total annual production.

7.0 Cogeneration

The following section provides guidance to facilities submitting annual compliance reports with either integrated or stand-alone cogeneration.

Cogeneration is the combined production of heat for use in industrial facilities and the production of electricity as a by-product. Electricity not used within the plant may be offered to the competitive electricity market. Combined use of heat in production and to generate electricity improves the overall efficiency of the plant and can displace higher emissions coal-generated electricity. Treatment of cogeneration under the *Specified Gas Emitters Regulation* recognizes the environmental benefits associated with the higher energy efficiencies generally afforded by cogeneration operations.

The cogeneration calculation methodology compares to refererence technology where the heat was sourced from a conventional boiler operating at an efficiency of 80 per cent and the electricity was produced from a natural gas combined cycle electricity generation plant with a greenhouse gas intensity of 0.418 tonnes CO_2e/MWh. No reduction target is placed on the emissions associated with electricity generation.

Note: Cogeneration facilities often have insulated switchgear where SF6 emissions may be present and these should be reported as described in Section 5.2.3.

7.1 Definitions

Standalone cogeneration facilities are those units that derive all their energy outputs from on-site fuel combustion. These units do not have any other external energy inputs. All the thermal and electrical output should be traced down to a single source. All emissions from a standalone facility should be from cogeneration related equipment.

Integrated cogeneration facilities are those units that, in addition to their own fuel source, also have other sources contributing to generating thermal or electrical output. This source could be combustion at the host site, any exothermic reaction, or, in some cases, import or export of steam from a second heat source depending upon demand.

7.2 Cogeneration Reporting Requirements

Reporting requirements for cogeneration facilities differ from reporting requirements for regular facilities. This is to recognize the environmental benefits of the combined generation of heat and electricity at a facility. Facilities that use deemed greenhouse gas emissions must provide the following information in their compliance report:

- Total greenhouse gas emissions (G_T) in tonnes CO_2e from the cogeneration facility for January 1 to December 31;
- Fuel used by the cogeneration facility for January 1 to December 31;
- If fuel factors are used to calculate the greenhouse gas emissions, provide the factors with references;
- If fuel analysis is used to calculate the greenhouse gas emissions, provide a synopsis of the fuel analysis;

- Total net heat production (H) in GJ produced by the cogeneration facility for January 1 to December 31;
- Mass/volume of fuel deemed used to produce heat for January 1 to December 31;
- Total electricity generation (E) in MWh generated by the cogeneration facility (net of station loads) for January 1 to December 31; and
- Deemed greenhouse gas emissions from electricity generation (D_E) in tonnes CO_2e for January 1 to December 31.

The reporter must also provide the following information in either the comments section of the compliance report or in a separate document:

- Simple conceptual/logic diagram of the cogeneration layout including boundary, and control volume used for heat calculations;
- A description of the cogeneration unit boundary;
- Explanation of how heat calculations were done, including how the enthalpies were averaged;
- A list of the various thermal streams entering or leaving the cogeneration boundary and annualized flow averages, temperature averages, and pressure averages for each stream; and
- Hours of operation of the cogeneration facility for January 1 to December 31.

Additional information about heat calculations, cogeneration facility boundaries, etc. is available in the *Additional Guidance for Cogeneration* document.

7.3 Greenhouse Gas Emissions from Cogeneration

Total annual greenhouse gas emissions for both integrated and stand-alone cogeneration facilities are calculated according to the following formula:

$$G_T = f \times M_F$$

Where:

G_T	=	Total greenhouse gas emissions from the cogeneration facility for the year/half-year	[tonnes CO_2e]
F	=	Emission factor for the fuel used in the cogeneration facility	[tonnes CO_2e/unit fuel]
M_F	=	Mass/volume of fuel used in the cogeneration facility during the year/half-year	[units of fuel used]

7.4 Deemed Greenhouse Gas Emissions for Electricity Generation

Deemed greenhouse gas emissions are calculated according to the methodology outlined below.

7.4.1 Measure the Total Electricity Generated by the Cogeneration Facility

Deemed emissions associated with electricity generation are calculated based on electrical generation. That is, the calculation should account for the net electricity that crosses the cogeneration boundary (exported to the host facility and the electricity grid). This calculation of electrical generation should be net of station loads (i.e. loads integral to the function of the cogeneration unit).

7.4.2 Calculate the Deemed Greenhouse Gas Emissions for Electricity Generation

Deemed greenhouse gas emissions for a cogeneration facility are based on a natural gas combined cycle turbine with a deemed greenhouse gas emissions intensity of 0.418 tonnes CO_2e/MWh and are calculated according to the following formula:

$$D_E = 0.418 \times E$$

Where:

D_E	=	Deemed greenhouse gas emissions from electricity generation	[tonnes CO_2e]
E	=	Electricity generation by the cogeneration facility during the year	[MWh]

7.5 Emissions Intensities Calculation

The net emissions intensity calculations differ between integrated and stand-alone cogeneration facilities. Integrated cogeneration units may have multiple products depending on the nature of the facility.

Stand-alone cogeneration facilities produce heat and electricity; however, emissions associated with electricity generation are excluded from the emissions intensity calculation.

Similar to the calculation described in Section 6.7 above, the net emissions intensity is computed by subtracting all credits used for true-up from the numerators of the following equations. This calculation is done automatically in sheet E5 of the compliance report form, when applicable.

7.5.1 Integrated Cogeneration Facility

The following formula is used to calculate the emissions intensity of an integrated cogeneration facility:

$$EI = (TAE - D_E) / P$$

Where:

EI	=	Emissions intensity for the compliance year.	[tonnes CO_2e / unit of

			product]
TAE	=	Total Annual Emissions from the entire facility for the compliance period. ***(Excluding:*** *GHG emissions from industrial process, CO_2 emissions from combustion of biomass and CO_2 emissions from decomposition of biomass but including emissions from the cogeneration unit).*	[tonnes CO_2e]
D_E	=	Deemed greenhouse gas emissions from electricity generation for the compliance period.	[tonnes CO_2e]
P	=	Production for the compliance period.	[appropriate units of production]

7.5.2 Stand-Alone Cogeneration Facility

The emissions intensity for stand-alone cogeneration facilities is calculated using the following formula:

$$EI = (G_T - D_E) / H$$

Where:

EI	=	Emissions intensity for the compliance period.	[tonnes CO_2e / GJ]
G_T	=	Total annual greenhouse gas emissions for the compliance period	[tonnes CO_2e]
D_E	=	Deemed greenhouse gas emissions attributed to electricity generation for the compliance period	[tonnes CO_2e]
H	=	Total [illegible]at produced by the cogeneration facil[illegible] during the compliance period.	[GJ]

7.6 Significant Change in Cogeneration Unit Operation

If the operation of the cogeneration facility changes such that there is no material production of one of the energy products, all or part of the cogeneration adjustment may be removed from the baseline emissions intensity. This situation could arise if the host facility decreased its take of energy from the cogeneration plant such that one or more of the products was no longer used. These situations will be reviewed on a case-by-case basis.

8.0 Data Confidentiality and Access to Information

8.1 Request for Confidentiality

In accordance with section 16 of the *Specified Gas Emitters Regulation*, facilities may request that certain information in the specified gas compliance report be kept confidential for a period of up to five years on the basis that the information is commercial, financial, scientific or technical information that would reveal proprietary business, competitive or trade secret information about a specific facility, technology or corporate initiative. Confidentiality can be granted to specific information contained in portions of the compliance report, but cannot be granted for the entire compliance report.

To request confidentiality, **a written request must be included with the compliance report that clearly states the specific information to be kept confidential, including justification for each piece of information**. If additional information is requested from a facility as part of AESRD's compliance report review, the facility may also submit a written request for confidentiality of this information at that time, with appropriate justification for the request.

Each confidentiality request will be reviewed by AESRD and a decision will be made by the Director within 150 days from the letter of submission date. During this review, the portions of the information for which confidentiality has been requested are considered prescribed information under the *Freedom of Information and Protection of Privacy Act*. The confidentiality request and evaluation process is illustrated in Figure 3.

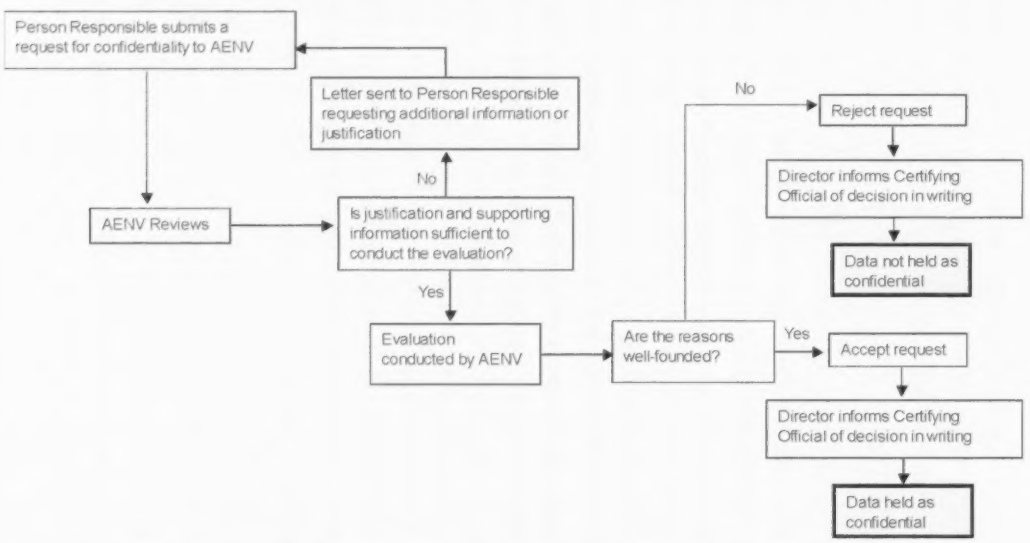


Figure 3: Confidentiality process for the specified gas emitters program.

In accordance with section 17 of the *Regulation*, the Director must submit an annual confidentiality report to the Information and Privacy Commissioner that includes the

number of confidentiality requests received, number of confidentiality requests approved, and the period of time prescribed for each approved request.

Note: *AESRD cannot guarantee confidentiality of information for which confidentiality has not been requested.*

8.2 Use of Annual Compliance Report Information

AESRD will publish information that is collected through the *Regulation* on a regular basis. Such publications include facility-level data reported in the compliance report, including, without limitation, total annual emissions, annual emissions intensity, and total compliance obligation (true-up). Prescribed (confidential) information will be published in aggregate form such that individual facility information cannot be identified.

Non-confidential information contained in the compliance report may be published in any form or manner the Director considers appropriate.

8.3 Access to Annual Compliance Report Information

According to section 13 of the *Regulation*, a person wishing to access compliance information that has not been deemed confidential must first submit a written request for the information directly to the facility. If the request is refused or not satisfied within 30 days, a request may be submitted to AESRD for the information. A copy of the correspondence with the facility must be included. AESRD will review all requests for information and release information that has not been granted confidentiality. Figure 4 shows the process for requesting access to information reported under the *Regulation*. Requests for aggregated or regularly published information can be submitted directly to AESRD and will be responded to at the discretion of the director. No information that has been granted confidentiality or would be considered proprietary business, competitive or trade secret information about a specific facility, technology or corporate initiative will be shared.

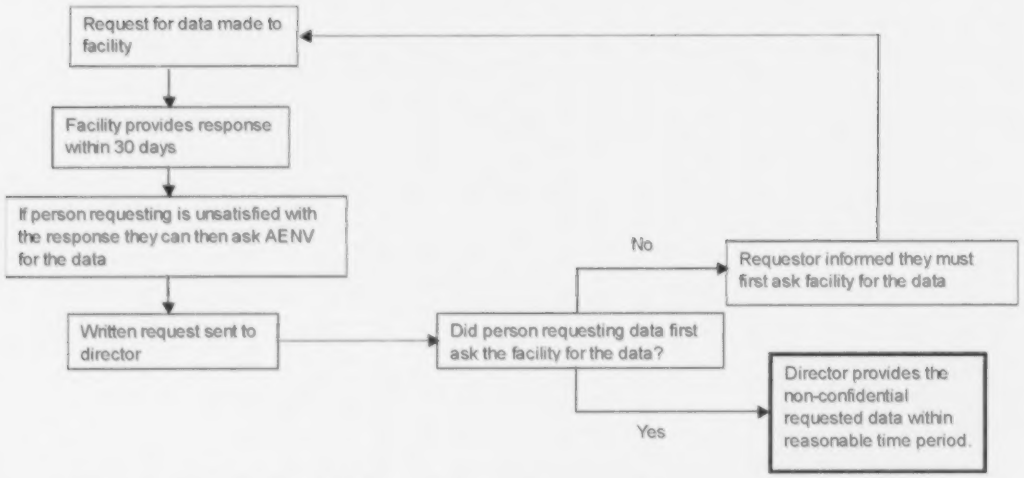


Figure 4: Process for requesting non-confidential information reported through the *Regulation*.

9.0 Third Party Verification

. All facility specified gas compliance reports must be verified before they are submitted to AESRD. This requirement for third party verification is consistent with international standards requiring independent, third party verification for greenhouse gas assertions.

AESRD has released detailed guidance for verifiers conducting greenhouse gas verifications in Alberta. This guidance is available on AESRD's website in the *Technical Guidance for Greenhouse Gas Verifications at Reasonable Level Assurance*. The information below provides information for facilities undergoing verification.

The verifier is required to assess the facility's compliance report, including emissions and production data, against the facility's approved baseline emissions intensity and program criteria to ensure the greenhouse gas assertion is fairly presented at reasonable level of assurance. The Greenhouse Gas Assertion refers to the emissions, production information, cogeneration data, and intensity value reported by the facility.
The verifier must flag discrepancies in reported data, identify areas where interpretation of data differs from guidance provided by AESRD, and flag unresolved discrepancies.

The facility must make every effort to resolve issues identified during verification prior to finalization of the verification and submission of the compliance report to AESRD. If the facility is unable to fully resolve all issues prior to the compliance deadline, the facility may submit a modified Statement of Verification with all associated documentation and contact AESRD to determine appropriate corrective actions. Corrective action may include enforcement action or penalties. If the resolution of issues identified during the audit would affect the baseline period or require a departure from the methods used to establish the facility's baseline emissions intensity AESRD must be notified immediately and any changes flagged in the compliance report submitted to AESRD.

If changes are made to the compliance submission after the verification, the verifier must assess if the changes are consistent with requirements for subsequent events stated in Section 5.6 of the verification guidance document.

The final audience for the verification report is AESRD. All verification reports must meet the requirements outlined in Section 9.2.6 below. Verification reports that do not meet these requirements may be considered incomplete, and could result in the facility being deemed out of compliance with the *Regulation*.

9.1 Verification Fundamentals

9.1.1 Terminology

Assurance level refers to the confidence level required by the program authority and used by the verifier to assess the greenhouse gas information to express a written conclusion on the facility's compliance assertion.

Auditor is a person or persons meeting the requirements of section 18 of the *Regulation* that is hired by AESRD to review a facility's compliance assertion on behalf of the government.

Compilation refers to the process of completing a facility's compliance report submission. Compilation may be done internally by the reporting company or by a qualified external body contracted by the reporting company. Compilation services and verification services cannot be provided by the same company.

Greenhouse Gas Assertion refers to the emissions, production information, cogeneration data, intensity value, and compliance obligation reported by the facility. If a facility is requesting emissions performance credits the quantity and justification for the request is part of the greenhouse gas assertion.

Designated signing authority refers to an individual who has binding authority for the verification company. This person must meet the requirements of Section 18 of the *Specified Gas Emitters Regulation*, and can be the lead verifier. This person's signature is provided on behalf of the verification team on the statement of qualifications, statement of verification, and conflict of interest checklist.

Lead verifier is the individual leading the verification team. This person is responsible for coordinating the verification and ensuring that appropriate expertise is available to review all aspects of the greenhouse gas assertion.

Limited assurance is a moderate (review) level of assurance, or negative assurance. Limited assurance is based on identifying anomalies rather than confirming an assertion.

Materiality refers to the cumulative, absolute magnitude of errors, omissions, or misrepresentations that affect an assertion. Materiality is discussed further in Section 9.1.9.

Peer reviewer is an independent, qualified professional who reviews the third party verification. This person cannot be the lead verifier or designated signing authority.

Reasonable assurance is a high level of assurance, or positive assurance. A reasonable assurance statement is a direct, factual statement expressing the opinion of the verifier.

Verifier is a person or persons that meet the requirements of Section 18 of the *Regulation* and undertake the independent, third party review of a facility's greenhouse gas assertion.

Verification describes the process by which an objective third party reviews an assertion and provides an opinion on the conclusion of the assertion.

9.1.2 Qualifications of the Third Party Verifier

The verifier (lead verifier and verification team) is defined as a qualified person or persons that make up a verification team that verifies and provides assurance on the greenhouse gas assertion.

The verification team must have technical expertise and detailed knowledge in the following areas:

- Data audit practices and data verification standards;
- Detailed knowledge of the *Specified Gas Emitters Regulation* and associated requirements;
- Verification criteria and the appropriate application of these criteria within the defined scope of the verification;
- Technical expertise for the sector in which the verification team plans to operate in, including:
    - Knowledge of specific greenhouse gas activities and technologies;
    - Identification and selection of greenhouse gas sources, sinks, and reservoirs;
    - Quantification, monitoring and reporting, including relevant technical and sector issues; and
    - Situations that may affect the materiality of the greenhouse gas assertion during typical and atypical operating conditions; and
- Be able to operate as a business including, policies, finances, and quality review of products and services.

Verification teams are required to bring in appropriate resources such as **subject matter experts** needed to augment the audit team skills and expertise.

Verification teams are strongly encouraged to use a team approach that blends skill sets of both accountants and professional engineers to support the verification. Verification teams need to have the capacity to accurately assess a spectrum of issues from the completeness of data inventories and appropriateness of quantification methodologies/emissions factors being used to the robustness of the data management system.

The **designated signing authority** must sign and submit the statement of qualifications, statement of verification, and conflict of interest checklist provided in the compliance report form. The designated signing authority must be either an accountant registered under the *Alberta Regulated Accounting Profession Act* (or equivalent) or a professional engineer registered under the *Engineering and Geoscience Professions Act* (or equivalent) in good standing with the professional organization to which they belong. The individual must be trained in ISO 14064-3, and in any other relevant assurance standards that may apply.

AESRD strongly encourages the lead verifier to be the designated signing authority.

9.1.3 Accreditation

AESRD will review accreditation options in 2013 to assess alignment with verification requirements in the specified gas emitters program and Alberta offset system.

9.1.4 Independence

Independence is a surrogate measure for the objectivity of the verifier. It is a key qualification for a verifier. The verifier must be able to demonstrate independence including having sufficient and appropriate systems in place to document and manage independence of all verification team members. The threats to independence are:

Self-interest

This occurs when the verifier or a member of the verification team or a person in the chain of command for the verification could directly benefit from a financial interest in the verification client, or when there is any other self-interest conflict with respect to the verification client. For example:

- Owning shares of the verification client;
- Having a close business relationship with the client;
- Contingent fees relating to the results of the engagement; or
- Potential employment with the verification client.

Self-review

This occurs when a member of the verification team could be in a position of reviewing his or her own work. For example:

- Involvement of the verification organization in the compilation of the data contained in the assertion, including documentation.
- A verification organization member performing non-verification services (e.g., consulting) that directly impact the client's assertion, such as implementing the greenhouse gas or production data management systems; or
- A member of the verification team having previously been a greenhouse gas or production data compiler of the verification client or who was employed by the verification client in a position to exert direct and significant influence over the client's assertion being reviewed.

Advocacy

This occurs when a verifying organization or a member of the verification team or a person in the chain of command for the verification promotes, or may be perceived to promote, a verification client's position or opinion to the point that objectivity may, or may be perceived to be, compromised. For example:

- Dealing in, or being a promoter of, emission performance credits on behalf of a client;
- Advocating on behalf of the client to advance a particular position or point of view on an issue that directly affects the greenhouse gas assertion; and
- Acting as an advocate on behalf of the verification client in litigation or in resolving disputes with third parties.

Familiarity
This occurs when, by virtue of a close relationship with a client, its directors, officer or employees, the firm or a member of a verification team becomes too sympathetic to the client's interests. For example:

- A person on the verification team has a close personal relationship with a person who is in a critical greenhouse gas or production compilation role at the client; or
- Acceptance of significant gifts or hospitality from the client.

Intimidation or Economic Implications
This occurs when a member of the verification team or a person in the chain of command is deterred from acting objectively and exercising professional scepticism by threats, actual or perceived, from the directors, officers or employees of the client. For example:

- The threat of being replaced as the verifier due to a disagreement with the application of greenhouse gas quantification methodology;
- Fees from the verification client represent a large percentage of the overall revenues of the verifier;
- The application of pressure to inappropriately reduce the extent of work performed in order to reduce or limit fees; and
- Threats arising from litigation with a client.

If it is determined that there is a real or potential conflict of interest, and both parties wish to pursue the verification, written evidence must be provided to AESRD prior to the verification describing the actions that will be taken to mitigate the conflict in order to preserve actual and perceived independence. AESRD will assess all potential conflict of interest cases. In cases where it determined that a conflict of interest cannot be effectively managed, facilities will be required to select an alternate verifier.

AESRD recognizes that some familiarity with a facility and/or processes is helpful in understanding and reviewing a facility's greenhouse gas assertion. However, AESRD also recognizes that this can compromise a verifier's impartiality over the long-term.

Verifiers (company and lead verifier) can complete a maximum of **five** consecutive verifications for facility. A mandatory **two** year break is required before the verifier can undertake additional verifications for the facility. Note, the five verifications includes baseline applications and baseline restatements where a full reverification is required, but does not include amendments to previous verification reports.

Note, *In certain situations, AESRD may require the use of a different third party verifier prior to the five year limit. Examples of when this may be required include adverse audit conclusions or multiple restatements of compliance or baseline submissions.*

9.1.5 Verification Standards

Verifiers are required to use the ISO 14064-3 verification standard and any other additional standards that the respective professions may require, which includes for example:

- Standards for Assurance Engagements, Canadian Institute of Chartered Accountants (CICA) Handbook – Assurance Section 5025
- Canadian Standard on Assurance Engagements (CSAE) 3410 – Assurance Engagements on Greenhouse Gas Statements

These standards ensure a consistent level of rigour in the verification process such that a peer verifier or auditor would come to the same conclusion as the verifier.

The following documents provide guidance to assist verifiers in completing third party verification:

- Climate Change and Emissions Management Act
- Specified Gas Emitters Regulation
- Technical Guidance for Completing Specified Gas Compliance Reports
- Technical Guidance for Completing Specified Gas Baseline Emissions Intensity Applications
- Guidance for Landfill Emissions

9.1.6 Signatures

The designated signing authority[1] for the verifier must be a chartered accountant or professional engineer and may be the lead verifier. This person must have the ability to bind the corporation. The signing authority must sign and submit an original statement of qualification, statement of verification, and conflict of interest as part of the verification report. **Signatures on behalf of a corporation are not acceptable under the *Specified Gas Emitters Regulation*.**

> The *Specified Gas Emitters Regulation* requires the third party verifier to be an individual. If a company wishes to sign on behalf of the Corporation, sign-off must be done as:
>
> Company Name
> Per [name and signature of Corporate Binding Official]

The *Electronic Transactions Act* allows for the use of electronic signatures in place of written signatures. The electronic signature must be sufficient to identify the person signing and be consistent with the purpose of the document or record being signed.

[1] For the purposes of the verification for the Alberta offset system, the lead verifier and signing authority do not need to be the same person. The lead verifier can be a qualified individual with appropriate expertise that is not a chartered accountant or professional engineer. In these cases, a chartered accountant or professional engineer must provide a peer review and act as the signing authority for the verification.

AESRD will accept electronic signatures for the purposes of compliance under the *Specified Gas Emitters Regulation*; however, AESRD reserves the right to request signed originals where the electronic signature is ambiguous or cannot be verified.

9.1.7 Verification Criteria

Verification criteria are established by the verifier prior to the site visit. Criteria must be set to test that the facility's compliance report adheres to the requirements in the *Regulation,* and that emissions and production were correctly calculated in a transparent and replicable manner, and are compared assessed against the facility's approved baseline emission intensity. As such, verification criteria will vary between facilities.

An overview of the verification criteria and sampling plan must be appended to the verification report.

9.1.8 Sampling and Review of Records

Verifiers are required to ensure the facility has collected sufficient and appropriate data, records, and supporting information to substantiate the greenhouse gas assertion. This includes a review of the data management system and input data for the emissions, production, and if applicable, cogeneration; equations; assumptions, monitoring; process flow diagrams; data flow diagrams; and other records deemed necessary by the verifier.

Some facilities that have failed a government audit have failed due to incomplete or missing records and poor data management systems.

The verifier must be able to pull a reasonable sample to assess project conformance with program requirements.

The verifier cannot sign off on a greenhouse gas assertion that has insufficient or incomplete supporting records.

9.1.9 Materiality

Materiality refers to a threshold for errors, omissions, and misrepresentations (discrepancies) in a facility's greenhouse gas assertion. Verifiers cannot issue a clean assurance statement if there are unresolved individual or aggregate discrepancies above the materiality threshold.

The materiality threshold for compliance with the *Regulation* is set based on facility size as shown in Table 4 below. Discrepancies below the materiality threshold are deemed **immaterial**. A verifier may issue a clean statement of verification for a facility that has unresolved immaterial discrepancies. Discrepancies above the materiality threshold are deemed **material**. The verifier cannot issue a clean statement for a facility greenhouse gas assertion that has unresolved material discrepancies.

Table 4: Materiality threshold levels for compliance report submissions.

Total Annual Emissions	Materiality Threshold
< 500 kt CO_2e	5 per cent
≥ 500 kt CO_2e	2 per cent

Quantitative discrepancies are numerical errors where the discrepancy magnitude can be estimated or calculated to a reasonable degree of accuracy.

Quantitative discrepancies are assessed against the materiality threshold on an aggregate of magnitude basis, regardless of the combined effect of overstatements and understatements, in the following way (see further below for an example):

1. Each discrepancy (Δ_i) is quantified on a tonnes CO_2e basis for emissions discrepancies or on a production unit basis for production discrepancies, including whether it is an overstatement (+) or an understatement (-).
2. The net effects of all combined emissions discrepancies (Δ_{TAE})[2] and production discrepancies (Δ_P) are quantified:

$$\Delta_{TAE} = \sum_i \Delta_{i(emissions)}$$

$$\Delta_P = \sum_i \Delta_{i(production)}$$

3. The total annual emissions and production values are corrected for the net effect of all identified discrepancies:

$$TAE_{corrected} = TAE_{reported} - \Delta_{TAE}$$

$$P_{corrected} = P_{reported} - \Delta_P$$

4. Each individual discrepancy is calculated on a percentage basis relative to the emissions intensity, which is corrected for the net effect of all identified discrepancies. This determines the net effect that each discrepancy has on the facility's emissions intensity:

$$D_i = \frac{\Delta_i}{TAE_{corrected}} \times 100\%$$

[2] **Note:** For facilities with cogeneration, all instances of TAE in this section should be replaced with TAE-D_e, as this represents the numerator of the emissions intensity calculation.

$$D_i = -\frac{\Delta_i}{P_{corrected} + \Delta_i} \times 100\%$$

5. The absolute value of each discrepancy is then summed to see if the total error for the compliance assertion exceeds the materiality threshold:

$$Total\ Error = \sum_i |D_i|$$

Where:

Δ_i	=	Each individual discrepancy, expressed in CO_2e for emissions discrepancies and in the production unit for production discrepancies.
D_i	=	Each individual discrepancy (D_1, D_2, D_3,…) expressed as a percentage.
$TAE_{corrected}$	=	The total annual emissions value, corrected for the net effect of all identified quantitative discrepancies.
$P_{corrected}$	=	The total production value, corrected for the net effect of all identified quantitative discrepancies.

Total discrepancies below the materiality threshold are deemed **immaterial**, and are assessed on a case-by-case basis to determine appropriate corrective action. The third party verifier may issue a limited level assurance statement for a compliance assertion that contains unresolved immaterial discrepancies; however, unresolved immaterial and material errors must be identified, detailed and quantified in the verification report.

Example:

An unobtanium mining operation reports total annual emissions of 101,000 tonnes CO_2e and a total production of 100,000 tonnes processed ore. However, three discrepancies are identified:

1) 2,000 tonne CO_2e overstatement of stationary fuel combustion emissions;
2) 1,000 tonne CO_2e understatement of on-site transportation emissions; and
3) 3,000 tonne overstatement of production.

The net effect of all discrepancies on the total annual emissions and production values:

- $\Delta_{TAE} = \Delta_1 + \Delta_2 = 2{,}000\ tCO_2e - 1{,}000\ tCO_2e = 1{,}000\ tCO_2e$
- $\Delta_P = \Delta_3 = 3{,}000$ tonnes

The total annual emissions and production values, corrected for the identified discrepancies:

- $TAE_{corrected} = TAE_{reported} - \Delta_{TAE} = 101{,}000\ tCO_2e - 1{,}000\ tCO_2e = 100{,}000\ tCO_2e$
- $P_{corrected} = P_{reported} - \Delta_P = 100{,}000$ tonnes $- 3{,}000$ tonnes $= 97{,}000$ tonnes

The discrepancies, expressed as a percentage relative to the emissions intensity, are:

- $D_1 = \Delta_1 / TAE_{corrected} = 2{,}000\ tCO_2e / 100{,}000\ tCO_2e \times 100\% = 2\%$
- $D_2 = \Delta_2 / TAE_{corrected} = -1{,}000\ tCO_2e / 100{,}000\ tCO_2e \times 100\% = -1\%$
- $D_3 = -\Delta_3 / (\Delta_3 + P_{corrected}) = -3{,}000$ tonnes $/ 100{,}000$ tonnes $\times 100\% = -3\%$

So the total discrepancy for comparison with the materiality threshold is:

- Total Error $= |D_1| + |D_2| + |D_3| = 2\% + 1\% + 3\% =$ **6%**

In this example, the compliance assertion contains a **material** discrepancy.

Qualitative discrepancies are non-numerical discrepancies and may be difficult to quantify. These include, for example, inconsistent methodologies, facility boundary issues, misleading presentation of circumstances, poor data handling or record keeping, and lack of transparency. These discrepancies can erode the verifier's ability to reach a necessary level of comfort with the greenhouse gas assertion. Determining if a material, qualitative error has occurred is the professional judgement of the verifier.

Deviations in methodology and quantification approach from that used in calculating the approved baseline emissions intensity must be approved by AESRD, Deviations that do not have approval must be noted as a discrepancy and be disclosed in the verification report.

Note, AESRD requires materiality to be assessed based on both the net and absolute value of the discrepancies. See Section 3.5 of the Technical Guidance for Greenhouse Gas Verifications at Reasonable Assurance for more information.

9.1.10 Level of Assurance

AESRD requires **reasonable** (audit) level assurance for all greenhouse gas emissions verifications. This applies to all 2012 specified gas compliance submissions and any new or restated baseline emission intensity applications. Existing, approved baselines remain valid.

9.1.11 Peer Review Process

AESRD requires peer review as part of the verification process. This process requires that persons different from those who undertook the verification work perform a final evaluation of the evidence and conclusions of the verification team. The name and qualifications of the peer reviewer must be provided in the verification report along with the members of the verification team.

9.1.12 Verification of Resubmissions

In situations where facilities re-submit previously submitted compliance reports with corrections, updates, or changes, verification will be required on either the entire report or only the changes that were made, depending on the nature and the extent of the changes.

Minor changes and clarifications typically require a signed letter from the verifier stating what was changed, the rationale for the change, and that no other changes were made to the compliance report. When changes are significant or affect multiple portions of the compliance report, a complete verification may be required. In some cases Alberta Environment and Sustainable Resource Development may require that a new

9.2 Verification Process

9.2.1 Engaging a Third Party Verifier

The facility is responsible for engaging a verifier to conduct the verification of the greenhouse gas assertion prior. The facility must ensure that the verifier hired to complete the verification meets the requirements for a verifier identified in Section 9.1.2 and the independence requirements described in Section 9.1.4.
The verifier will conduct a client evaluation to assess the client, the facility, including type and availability of records to support the verification, and verification team composition. The verifier may decline the work if the client evaluation causes the verifier to believe the assertion has a high likelihood of not passing a verification.

9.2.2 Planning the Verification

The verifier will develop a detailed internal verification plan and sampling plan to guide the verification, which are **not** shared with the facility. A more general verification plan and sampling plan will be shared with the facility prior to the site visit.

The verifier is required to disclose the following to the facility prior to the site visit:

- The verification objective, scope and level of assurance being used;

- The preliminary greenhouse gas assertion;
- The program criteria being used;
- The assurance standard being used;
- Members of the verification team;
- A description of the general process that will be used;
- A list of requested documents and records;
- A preliminary schedule of activities for the verification; and
- A request for resources.

The verifier should work with the facility to determine a reasonable timeframe and schedule for the verification. This will include identifying key contacts for the facility, setting dates for the site visit, and estimating a completion date for the verification. This allows both parties to set up an appropriate verification schedule to complete the verification as efficiently as possible.

9.2.3 Site Visits

Verifiers are required to conduct a site visit as part of the verification. Site visits are used to help confirm emissions/production inventories, the information reported in the assertion, and to review records and data management systems.

Where a facility is spread out over a large geographic area (e.g., pipelines), it may not be practical to visit all sites each year. Site visits should be undertaken on a sample basis. Justification for the sample size and selection process must be provided in the verification report.

If a site visit has been undertaken in the same compliance year for other reasons, such as a baseline restatement, the verifier may not need to redo the site visit for the facility. The verifier must make a decision on the relevance of the site visit to the current verification, and provide justification in the verification report if a second site visit is not done.

Verifiers will contact the facility to arrange the timing of the site visit. Facilities are expected to be work with the verifier to establish a schedule that allows for all required verification activities. Failure to grant access to the verifier or insufficient access to the site or personnel may result in a qualified audit finding.

9.2.4 Access to Information and Supporting Materials

Facilities must provide sufficient information to allow the verifier to evaluate greenhouse gas assertion and render an assurance statement. Documents and information required to complete the verification will be facility specific and may include, but are not limited to:

- The baseline emissions intensity application and supporting documents;
- The compliance report, containing the compliance assertion to be verified;
- Data flow sheets;
- Raw data used for calculations (e.g., fuel data, fuel composition, production records);

- Data management system records and information (e.g., analytical records, instrumentation maintenance records) used to compile the compliance report;
- Key supporting documents, including invoices, receipts, calibration records, lab analysis, etc.;
- Access to the facility to conduct a site visit;
- QA/QC records; and
- The quantification methodology document (see Section 5.7).

Facilities can assist the verification process by having all relevant documents and records collated and available for the verifier before the start of the verification.

9.2.5 Closing meeting

The verifier is encouraged to provide a draft report to the facility before the verification is finalized. Parties may schedule a close out meeting to review the verification findings and attempt to resolve outstanding issues prior to issuing the statement of verification.

9.2.6 Verification Report

A verification report is issued by the verifier once the facility review is complete. The verification report provides a summary and discussion of the verifier's verification procedures and results. The report must be submitted to AERSD as part of the facility's specified gas compliance report.

Verifications should follow the structure outlined in Table 5 below.

Table 5: Standardized third party verification report format.

Verification Section	Facility Content	Further Comments and Description
Summary	Summary table containing: • Facility identification information • Facility contact information • Verification objective • Verification summary • Verification team members • Report and audit dates	This section must provide a brief overview of the verification. Use of the standardized format provided in templates facilitates government review.
Introduction	Provide an introduction to the facility and the verification. This must include a description of the: • Facility; and • Facility boundary. This includes: • The approved baseline emissions intensity; • The net emissions intensity limit; and • A summary of changes at the facility since the baseline period.	Boundaries should be defined by: • Geographical • Organization • Activities and processes • Greenhouse gas inventory • Relevant greenhouse gases • End products • Time period If information is excluded, justification must be provided. Process flow diagrams and aerial photos assist in understanding the scope of the verification. The purpose of the baseline intensity/baseline description is to ensure that they are still applicable to the facility. The discussion should include: • Identification of the calculations used.
Objective	Discuss the objective of the verification.	The objective of the verification should be to express an opinion rather than a particular conclusion.
Scope	Discuss the scope of the verification.	The scope should align with the description of the facility. Any discrepancies should be justified.
Program Criteria	List the program criteria used and any relevant supporting documentation used.	The program criteria are the benchmarks (e.g., act, regulations, protocols, guidance documents, etc.) used to assess the greenhouse gas assertion. Any unique benchmarks such as calculations for specific emissions must be justified. Note: ISO 14064-3 or CSAE 3410 are verification standards, not program criteria.
Final Verification Plan including Verification Strategy,	Verification strategy, verification plan, and sample plan. The actual verification procedures and sampling plan can be in an Appendix	The final version of the verification plan needs to be included in the verification report. It is helpful to describe the approach (i.e., degree of controls reliance) used in designing the verification plan.

Verification Section	Facility Content	Further Comments and Description
Verification Procedures and Sample Plan	In particular, describe the procedures used to assess: • Facility boundaries; • Methodologies, emission factors and conversions used; • Comparability with the approved baseline; • Conformance to the program criteria; • Integrity of the responsible party's data management system and controls; • Greenhouse gas data and information, including the type of evidence collected, verification testing and crosschecking; • Details of site visit; and Other relevant information.	Verification procedures need to be described in sufficient detail to communicate how the verification was done, but do not need to go into detail that compromises verifier's proprietary methods. Procedures need to connect to risks identified by the verifier for the greenhouse gas statement and attribute level for each material line item, including the nature, timing, and extent of the procedures. •
Verification Schedule	Provide a list of verification activities and dates	A timeline of the verification process
Verification Findings	Discuss findings including: • Material and immaterial discrepancies identified; • Weaknesses in the responsible party's data management system and controls; • Incompleteness in the greenhouse gas inventory; • Concerns with production values; • Changes in process flow diagram for the facility/offset project; • Observed issues with the facility boundary; and • A summary of findings including the summary of unadjusted differences table	Typically, if there is a problem with the data, one or more controls have failed. Verifiers are encouraged to document data and control errors such that the responsible party has sufficient information to determine corrective actions to improve the data management system over time. Note, the verifier cannot provide solutions to observed issues as this would be considered consulting and could compromise the verifier's independence.
Statement of Verification	The verifier's opinion on the greenhouse gas assertion	For facilities, the statement of verification must be consistent with Statement of Verification provided in the compliance report form and is appended to the verification report.
Confirmations	Documentation of confirmations done as part of the verification process, including inconsistencies observed.	Confirmations are used to check additional reporting information before it is submitted for compliance. Confirmations are discussed in Section 5.4 of the verification guidance.
Appendix	Facility submissions must include signed: • The Statement of Verification (SoV) • The Conflict of Interest (COI) • The Statement of Qualification (SoQ) If not included in the body of the report, include the final verification plan, final sampling plan, and any relevant documentation such as methodologies, and calculations that provide clarity and assist	

Verification Section	Facility Content	Further Comments and Description
	AESRD.	

Templates for the statement of qualifications and conflict of interest checklist are available in Section E of the Specified Gas Compliance Report template.

A template for the verification report is available from AESRD's website. While the layout of the report may be adjusted to suit individual preferences, the content specified in the template must be included. If a section is not relevant, justification for the omission must be provided.

9.2.7 Statement of Verification

The statement of verification is a statement on the legitimacy of the facility's greenhouse gas assertion. The statement must identify the facility, the compliance year, emissions assertion, and the verifier's opinion.

More information on the types of assurance statements, including an explanation of emphases of matter is available in Section 5.1 of the verification guidance document.

9.2.8 Statement of Qualifications

The statement of qualifications is an attestation signed by the designated signing authority stating the company hired to undertake the verification is sufficiently qualified to undertake the verification of the offset project. They are stating the company and verification team have the technical experience required to evaluate the correctness of the project.

The statement of qualifications must be signed and submitted to the registry as part of the supporting documentation for the project.

9.2.9 Conflict of Interest Checklist

The verifier **must** be free from conflict of interest discussed in Section 6.1.4 above.

The conflict of interest checklist must be completed and signed by the lead verifier **prior** to the verification and monitored throughout the engagement. If any conflicts are identified, the project developer or lead verifier should contact the AESRD to discuss the situation prior to undertaking the work. .

9.3 Subsequent Events

Verifiers are not required to actively monitor the validity of their reports after issuance; however, where it is brought to the attention of the third party verifier that a previous statement is no longer accurate, the verifier must notify the facility and AESRD to discuss further follow-up actions that may be required.

If the facility becomes aware of issues that cause a previously issue verification to invalid or inaccurate, the facility must notify the verifier and AESRD to discuss follow-up actions that may be required

Any changes or corrections to greenhouse gas assertion and previously issued verification reports may require new or updated verification documentation to be submitted to AESRD.

10.0 AESRD Audit

AESRD audits approximately 10 per cent of facility compliance submissions annually to assess conformance with program criteria. Facilities selected for audit will receive written notification of the audit.

AESRD also uses information collected during the audits to assess program performance and identify areas for improvement.

10.1 Facility Selection

AESRD uses the following criteria to select facilities for audit:

- Coverage across facilities and sectors;
- Facility size (annual emissions and production);
- Product and process complexity;
- The number of previous audits a facility has undergone;
- The results from previous audits;
- Familiarity of sectors/facilities within AESRD's Climate Change Secretariat;
- Issues related to the applicability of baseline emissions intensities (e.g. if AESRD is concerned that the baseline emissions intensity may not represent ongoing facility operations).
- Anomalies or issues encountered during the desktop review; and
- The number and extent of previous restatements that have been made.
- Other considerations that the director deems appropriate.

Based on the criteria above, some facilities may be audited more than once or be audited several times in succession to better understand how the facilities are performing over time.

10.2 Audit Process

AESRD's audit process uses a similar approach to third party verification with a few key differences. This process is outlined in Figure 5 and discussed below.

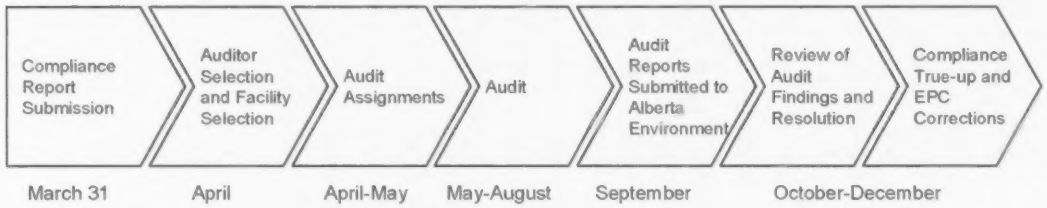
AESRD issues a Request for Proposal to solicit bids from qualified audit teams. Auditors are hired based on whether they meet the requirements for a third party auditor under Section 18 of the *Regulation;* their audit experience; and their sector specific expertise. Auditors hired by AESRD must meet the same independence requirements as verifiers; an audit team will not be assigned to a facility if there is an actual or perceived conflict of interest unless sufficient action can be taken to ensure independence.

Auditors are required to perform a site visit. Facilities must enable the site visit. Failure to allow access may result in a qualified audit finding, and could result in a compliance investigation.

Auditors may schedule a close-out meeting with the facility to discuss key findings and preliminary results. Note, compliance reports selected for audit are considered final and cannot be changed during the course of the audit. If issues are identified during the audit, the facility may provide additional information to clarify how the assertion was developed, but cannot make changes to compliance submission or greenhouse gas assertion.

The final audit report is submitted directly to AESRD. AESRD will review the audit findings and coordinate a follow-up meeting with the facility to review the audit findings and determine, what, if any follow-up action is required.

Figure 5: AESRD's compliance report audit process.



10.3 Materiality for AESRD Audits

Government audits use the same materiality threshold for audits as verification (see Section 9.1.9). Auditors must assess both quantitative and qualitative errors associated with a compliance report to reach a reasonable level of assurance on the greenhouse gas assertion. Auditors are required to identify all material and immaterial errors discovered during the audit in the final audit report. AESRD will work with the facility to determine appropriate, corrective actions.

10.4 Termination of an Audit

If the auditor identifies significant issues such as incomplete records, missing records, records in un-auditable formats, records that cannot be replicated such that the verifier cannot conduct the verification, or significant reluctance on the part of the facility to provide records or access during the site visit, the auditor, in consultation with AESRD, may issue notice to AESRD to terminate the audit.

Terminated audits are considered a failed audit. The facility will adhere to the error correction policy for material audit findings.

10.5 Error Correction

The procedures for correction of errors or discrepancies identified in AESRD audits is the same as that for errors identified by AESRD or the facility, and is described in Section 3.8.

10.6 Third Party Contracting for Re-audits

Facilities that are required to make corrections based on government audit that results in a re-audit will be required to use an audit team appointed by AESRD and paid for by the facility. The audit team will, in most cases, be the same team that identified the initial errors. If alternate audit team is needed, AESRD will select the audit team consistent with its selection criteria.

The audit team and facility will be required to enter into a third party agreement with the province to pay for the re-audit.

10.7 Audit Methodology

Verifiers are required to use the ISO 14064-3 verification standard and any other additional standards that the respective professions may require, which include for example,

- Standards for Assurance Engagements, Canadian Institute of Chartered Accountants (CICA) Handbook – Assurance Section 5025; and
- Canadian Standard on Assurance Engagements (CSAE) 3410 - Assurance Engagements on Greenhouse Gas Statements

These standards ensure a consistent level of rigour in the verification process such that a peer verifier or auditor would come to the same conclusion as the verifier.

10.8 Level of Assurance

AESRD requires audits be performed to a reasonable level of assurance.

10.9 Audit Report

Auditors must produce an audit report using the same table of contents provided in **Table 5** above. This report is submitted directly to AESRD. AESRD will share a copy of the audit report with the facility and will schedule a meeting to review audit findings and determine any follow-up required. All audit follow-up occurs between AESRD and the facility. The auditor is not included in the follow-up discussions or the audit close out meeting.

10.10 Confidentiality

Auditors are contracted by AESRD. As an agent of the government, they are bound by Government of Alberta confidentiality requirements, and must comply with all appropriate confidentiality regulations. Information collected for audit purposes is subject to Section 16 of the *Specified Gas Emitters Regulation*. Further, government contracts explicitly reference confidentiality requirements under the *Freedom of Information and Protection of Privacy Act.*

Facilities wishing to request confidentiality on information collected during the audit must submit a written request to the Director that identifies the confidential material and

provides justification for the request. More information about confidentiality can be found in Section 8.0.

10.11 Continuous Improvement

Additional information collected during the audit process is used to support program improvements and may be reflected in guidance changes, protocol reviews, or other as required and are part of a larger framework of on-going program reviews and improvements.

Glossary of Terms

Act means the *Climate Change and Emissions Management Act*

Activity Data is a quantitative measure of operations on site that result in GHG emissions, for example quantity of fuel consumed by specific equipment.

Baseline emissions intensity is the emissions intensity reference calculated by the facility and approved by the director.

Biomass refers to material derived from living or recently dead organisms. Examples include, but are not limited to: wood and wood products, charcoal, agricultural residue, landfill gas, and bio-alcohols. A more complete list is available in Section 5.1.9.

Biomass emissions are direct emissions resulting from the decomposition and/or combustion of biomass from plant materials and animal waste.

Certifying official is the person designated by the facility with signing authority for that facility.

Climate Change and Emissions Management Act is the enabling legislation passed in 2002 allowing AESRD to manage greenhouse gas emissions in the province.

Climate Change and Emissions Management Fund is the fund set up under the Climate Change and Emissions Management Act that is used to support research, development and deployment of transformative change technologies to reduce greenhouse gas emissions in Alberta.

Compliance assertion is the greenhouse gas emissions, production quantities, cogeneration data, emissions intensity value, and compliance obligation.

CO_2e is the 100-year global warming potential average of a unit of greenhouse gas (e.g. methane) compared to an equivalent unit of carbon dioxide (reference gas).

Direct emissions means the release of greenhouse gases from all sources located at a facility.

Director is AESRD's representative appointed under the *Specified Gas Emitters Regulation* who is charged with implementing the *Regulation*.

Emissions intensity is a facility's total annual emissions divided by production as calculated in Section E1 of the compliance report form. The emissions intensity is compared to the approved baseline emissions intensity to calculate the credits required or generated in the compliance period.

Emission offset is a reduction in one or more specified gases (regulated greenhouse gas emissions) occurring at sites not covered by the *Regulation*, which can lead to the production of an offset credit.

Emission performance credits are generated when a facility reduces its emissions intensity below its net emissions intensity limit. Emission performance credits are awarded on a tonne CO_2e reduction basis

Established facility is a facility that completed its first year of commercial operation on or before January 1, 2000, or that has completed eight consecutive years of commercial operation.

Facility is any plant, structure or thing that sits on one or more contiguous or adjacent sites that are operated and function in an integrated fashion and includes all buildings, equipment, structures, machinery and vehicles that are an integral part of the activity.

Flaring emissions are direct emissions from the controlled combustion of a gas or liquid stream produced on site for purposes other than producing energy. This includes, but is not limited to the incineration of waste petroleum and other hazardous materials, safety flares, and test wells.

Formation CO_2 emissions are direct, gaseous emissions of carbon dioxide recovered or recoverable at a well from an underground reservoir including, but not limited to, CO_2 emissions vented from gas sweetening and formation gas.

Fund credit is a compliance mechanism unit, equivalent to one tonne of CO_2e, which is purchased and submitted by making a payment into the Climate Change and Emissions Management Fund.

Greenhouse gases are the atmospheric gases responsible for the greenhouse gas effect. The most common greenhouse gases are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Less prevalent, but very powerful greenhouse gases include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6).

Global warming potential measures a greenhouse gas's relative warming effect on the Earth's atmosphere compared with carbon dioxide and is expressed as a 100-year average. AESRD currently utilizes the global warming potential value published in the International Panel on Climate Change Second Assessment Report for the gases regulated under the *Regulation*.

HFC species are hydrofluorocarbon gases and include: CHF_3, CH_2F_2, CH_3F, $C_5H_2F_{10}$ (structure: $CF_3CHFCHFCF_2CF_3$), C_2HF_5, $C_2H_2F_4$ (structure: CHF_2CHF_2), $C_2H_2F_4$ (structure: CH_2FCF_3), $C_2H_3F_3$ (structure: CHF_2CH_2F), $C_2H_3F_3$ (structure: CF_3CH_3), $C_2H_4F_2$ (structure: CH_3CHF_2), C_3HF_7 (structure: CF_3CHFCF_3), $C_3H_2F_6$ (structure: $CF_3CH_2CF_3$) and $C_3H_3F_5$ (structure: $CH_2FCF_2CHF_2$). These gases are regulated under the *Regulation*.

Industrial process emissions are direct emissions from sources directly associated with production that involve chemical or physical reactions, other than combustion, and where the primary purpose of the process is not energy production.

Industrial product use emissions are all direct emissions from the use of HFCs, PFCs or SF_6 associated with production that do not meet the definition of Industrial Process Emissions. Examples include SF_6 and HFC use as a cover gas and SF_6 in on-site industrial electrical equipment.

Materiality refers to a measure of the magnitude of an error, omission, or misrepresentation that would affect the compliance assertion stated in the baseline emissions intensity application or compliance statement.

Net emissions intensity is the facility's total annual emissions minus true-up options used (offset credits, emission performance credits, or fund credits), all divided by the facility's total annual production expressed in appropriate units.

Net emissions intensity limit is the facility's maximum net emissions intensity permitted under section 4 of the *Regulation*. This limit is set at 88 per cent of the baseline emissions intensity for existing facilities. New facilities are phased in at a rate of 2 per cent per year starting in their fourth year of commercial operation.

New facility is a facility that completed its first year of commercial operation on or after December 31, 2000 and has completed less than eight years of commercial operation.

On-site transportation emissions are direct emissions resulting from fuel combustion in machinery used for the on-site transportation of products and material including raw, intermediate and end products, wastes or land clearing.

Other/fugitive emissions are direct emissions that do not fall under the other emissions categories and includes, without limitation, intentional or unintentional releases of gases arising from the production, processing, transmission, storage and use of solid, liquid or gaseous fuels.

Person responsible is the person legally responsible for the operations of the facility. This person is the approval or registration holder for the facility regulated under the *Environmental Protection and Enhancement Act* or the legal owner of the facility for facilities not subject to EPEA approval.

PFC species are perfluorocarbon gases and include: CF_4, C_2F_6, C_3F_8, C_4F_{10}, c-C_4F_8, C_5F_{12}, and C_6F_{14}. These gases are subject to the *Regulation*.

Production is the total quantity of end product(s) produced by a facility. If a facility does not have an end product, the Director under the *Regulation* may specify an input, throughput or other thing as a production metric.

Regulation means the *Specified Gas Emitters Regulation*.

Reporter is the person designated by the facility responsible for completing the facility's baseline emissions intensity application and compliance report form.

Specified gases are the six greenhouse gas species—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), PFCs, HFCs, and sulphur hexafluoride (SF_6)—regulated under the *Climate Change and Emissions Management Act* and the *Regulation*.

Stationary fuel combustion emissions are direct emissions from the combustion of fossil or biomass fuel for the purpose of producing energy, excluding CO_2 emissions from the combustion of biomass.

Total annual emissions are the total direct emissions not including industrial process emissions, CO_2 emissions from combustion of biomass and CO_2 emissions from decomposition of biomass waste emitted by a facility in a calendar year.

Total direct emissions means the release of all specified gases expressed in tonnes CO_2e from all sources located at a facility.

Third party verifier is a professional engineer or chartered accountant qualified to conduct an independent, third party review of the facility's annual compliance report before it is submitted to AESRD.

Unit of production is an appropriate, common production metric for all end products of a facility consistent with the industry accepted norms for the sector to which the facility belongs.

Venting emissions are direct emissions from the intentional release to the atmosphere of waste gas or liquid streams.

Waste and wastewater emissions means direct emissions from disposal or treatment of waste or wastewater, but does not include CO_2 emissions from decomposition of biomass waste.

Year is a calendar year.

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